Syllabus

UNIT-I

INVESTMENTS

Concept; Real vs. Financial assets; Investment decision processes; Sources of investment information; Investment vs. Speculation; Factors to be considered in investment decision – Liquidity, Return, Risk, Maturity, Safety, Tax and inflation. The concept and measurement of return – Realized and expected return, Ex-ante and ex-post returns. The concept of risk, Sources and types of risk. Measurement of risk – Range, Standard Deviation and co-efficient of variation. Risk-return trade-Off. Risk Premium and risk aversion. Approaches to investment analysis – Fundamental analysis; Technical analysis; Efficient market hypothesis, Behavioural finance and heuristic driven biases.

UNIT-II

FIXED INCOME SECURITIES – ANALYSIS, VALUATION AND MANAGEMENT

Features and types of debt instruments, Bond indenture, Factors affecting bond yield. Bond yield measurement – Current yield, Holding period return, YTM, AYTM and YTC. Bond valuation: Capitalization of income method, Bond – Price theorems, Valuation of compulsorily/optionally convertible bonds, Valuation of deep discount bonds. Bond duration, Macaulay's duration and modified Macaulay's duration. Bond convexity, Considerations in managing a bond portfolio, Term structure of interest rates, Risk structure of interest rates. Managing Bond portfolio: Bond immunization, Active and passive bond portfolio management strategies.

UNIT-III

COMMON STOCKS – ANALYSIS AND VALUATION

Basic features of common stock, Approaches to valuation – Balance sheet model, Dividend capitalization models; Earnings capitalization models; Price-earnings multiplier approach and capital asset pricing model, Free cash flow model, relative valuation using comparables – P/E,P/BV,P/S; Security market indexes, Their uses; Computational procedure of sensex and Nifty.

UNIT-IV

PORTFOLIO THEORY

Concept of portfolio. Portfolio return and risk. Harry Markowitz's portfolio theory, Construction of minimum risk portfolio, The single - Index model. Capital market theory: Introduction of risk - free asset, Capital market line, Separation theorem. Capital asset pricing model (CAPM); Security market line. Identifying over - priced and under - priced securities. Arbitrage pricing theory (APT): The law of one price, Two factor arbitrage pricing, Equilibrium risk - return relations. A synthesis of CAPM and APT.

UNIT-V

PORTFOLIO EVALUATION

Performance measures – Sharpe's reward to variability index, Treynor's reward to volatility index, Jensen's differential index, Fama's decomposition of returns. Mutual funds: Genesis, Features, Types and schemes. NAVs, Costs, Loads and return of mutual funds, Problems and prospects in India, Regulation of mutual funds and investor's protection in India.

INVESTMENT MANAGEMENT

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MBA (OU) IV-Semester (Finance) (Elective-III)

CONTENTS

LIST OF IMPORTANT DEFINITIONS AND FORMULAE

UNIT - I

1. Investment act as a key element in business because based on capital, investor ascertains a specified quantity to produce outputs, purchases equipments, tools, buildings, etc.

2. The investment decisions are very important, firms must ensure that sufficient time is spent in planning these decisions and must ensure that all the top executives from the field of production, engineering, marketing etc., are involved in weighing up the projects carefully.

3. Liquidity means the potentiality of an investor to sell-off its assets without much delay and without making any significant discount. Liquidity is also called as marketability.

4. Return is one of the most important motivating factor which encourages investment. Return is the premium given to the investor for making investment.

5. The equations for quantifying the return, variance and standard deviation of individual security returns for both ex-post and ex-ante data are summarized in the following table.

Historical (Ex-post)	Expected (Ex-ante)
Arithmetic mean return	Expected return
$\bar{r}_1 = \dfrac{1}{n}\sum_{r=1}^{n} r_s$	$E(r_i) = \sum_{S=1}^{n} r_s P_s$
Variance (Risk)	Variance (Risk)
$\sigma_i^2 = \dfrac{1}{n-1}\sum_{i=1}^{n}(r_s - \bar{r}_p)^2$	$\sigma_i^2 = \sum_{S=1}^{n}[r_s - \bar{r}_i]^2 . P_s$
Standard deviation	Standard deviation
$\sigma_i = \sqrt{\dfrac{1}{n-1}\sum_{i=1}^{n}(r_s - \bar{r}_i)^2}$	$\sigma_i = \sqrt{\sum_{S=1}^{n}[r_s - \bar{r}_i]^2 . P_s}$

6. Determination of Beta of the Portfolio, $\beta_p = \sum_{i=1}^{N} N_i\beta_i$

7. According to Sewell (2001) behavioural finance is defined as "the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets".

UNIT - II

1. Debt instrument is legal obligation that enables the issuing party to raise funds by promising to repay a lender in accordance with the terms of a contract.

2. Bond indenture is a contract between bondholders and bond issuers by specifying certain rights and regulations to both the parties.

3. A trustee is a third party such as bank which is independent and act as a representative of bond holders.

4. Holding Period $= \dfrac{\text{Price change + Coupon interest (if any)}}{\text{Price at the beginning of the holding period}}$

5. The formula for approximate YTM is as follows,

$$AYTM = \dfrac{C + \left[\dfrac{(P_n - P_0)}{n}\right]}{\dfrac{(P_n + P_0)}{2}}$$

6.   Bond valuation is the process of determining the bond values. Bond values actually refers to the present values of securities like bonds, debentures etc. The present value of all the securities future cash flow is given by,

$$\text{Present value} = \left[\frac{\text{Coupon}_1}{(1+\text{YTM})^1} + \frac{\text{Coupon}_2}{(1+\text{YTM})^2} + \dots + \frac{\text{Coupon}_n + \text{Face value}}{(1+\text{YTM})^n} \right]$$

7.   DDB is a debt instrument which is issued by financial institutions. DDBs possess issue price and face value. On the date of maturity, the holder receives this issue price and face value. ∴ DDB valuation is as follows,

$$B_o(\text{DDB}) = \frac{FV}{(1+k)^n}$$

8.   Calculation of Macaulay's duration for semiannual bounds.

$$MD = \frac{C\left[(Z)^{(T)(m)+1} - Z - (YTM)(T)\right] + (MV)(T)(m)\left(\frac{YTM}{m}\right)^2}{C\left(\frac{YTM}{m}\right)\left[(Z)^{(T)(m)} - 1\right] + MV(YTM/m)^2}$$

$$Z = \left(1 + \frac{YTM}{m}\right)$$

9.   Active bond management need to adopt more/enhanced investment strategies so as to attain effective bond portfolio.

10. $MMD = \dfrac{MD}{1+YTM}$

UNIT - III

1.   Stocks are the form of securities which transfers the ownership of the firm in the form of bonds and debentures.

2.   PBR is the ratio of price per share divided by the book value per share,

$$PBR = \frac{\text{Price per share}}{\text{Book value per share}}$$

3.   The securities whose expected return is less than its equilibrium expected return. Equivalently, the securities with negative alpha. These securities impress investors and who therefore are willing to pay a price for them which is not justified by their EPS or P/E ratio.

4.   The intrinsic value of a share is represented by the equation.

$$P_o = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \dots + \frac{D_n}{(1+k_e)^n}$$

$$= \sum_{t=1}^{n} \frac{D_t}{(1+k_e)^t}$$

5.   Price of the share,

$$P_o = \frac{D_1}{K-g}$$

6.   The weighted average cost of capital is an aggregation of multiple costs overheads utilised by the company. Most commonly used costs include the post-tax cost of equity, preference and debt.

$$\boxed{WACC = w_q r_q + w_f r_f + w_e r_e (1-t)}$$

7.   Market price to book value ratio is calculated as follows,

$$\boxed{PBV \text{ ratio} = \text{Price / book value ratio} = \frac{\text{Market price per share at time } t}{\text{Book value per share at time } t}}$$

8.   The securities market refers to the market for equity debt and derivatives. The debt market is further classified into three types i.e., the government securities market, the corporate debt market and the money market.

UNIT - IV

1. The variance of returns for a portfolio of assets can be calculated with the following general formula.

$$\sigma_p^2 = \sum_{i=1}^{n} \sigma_i W_i^2 + \sum_{i=1}^{N} \sum_{j=1}^{n} \sigma_{ij} W_i W_j$$

2. The portfolio standard deviation of X and Y is,

$$= \sqrt{\sigma_X^2 W_X^2 + \sigma_Y^2 W_Y^2 + 2\rho_{XY} \sigma_X \sigma_Y W_X W_Y}$$

3. Portfolio return $= R_p = \sum_{i=1}^{N} X_i(\alpha_i + \beta_i R_m)$

4. The formula for calculating sharpe ratio is

$$S_r = \frac{\text{Rrisk Premium}}{\text{Total risk}} = \frac{\bar{r}_p - r_f}{\sigma_p}$$

5. The formula for calculating optimum portfolio of two securities is $P = \sqrt{\sigma_A^2 R_A^2 + \sigma_B^2 R_B^2 + 2R_A R_B(\gamma_{AB} \sigma_A.\sigma_B)}$

6. The risk return relationship propounded by the ATP can be represented as follows,

$$\bar{r}_p = r_f + \beta_{i1}(\bar{r}_1 - r_f) + \beta_{i2}(\bar{r}_2 - r_f) + \dots + \beta_{ij}(\bar{r}_j - r_f) + \beta_{ik}(\bar{r}_k - r_f)$$

7. $\text{Cov}(r_X, r_Y) = \dfrac{\sum[(r_X - \bar{r}_X)(r_Y - \bar{r}_Y)]}{n}$

UNIT - V

1. Closed ended mutual funds do not issue shares or units or repurchase or redeem on a periodic basis. Units of such schemes can be redeemed only on termination or through dealing in secondary market. Canshare, Canstock, Cangrowth, SBI Magnum, Mastershare etc., are examples of such mutual fund.

2. Money market funds are used in short-term liquid assets like Certificate of Deposits (CDs) or commercial papers and for them capital is raised by selling shares to the investing public at a price equal to the asset value of the existing shares outstanding plus a loading fee or service charge.

3. Any investor before investing in any business considers two essential factors and those are return and risk. Geometric mean return evaluates the average rate of return for a particular period.

Therefore, geometric mean return can be calculated as,

$$\text{GMR} = \sqrt[T]{(1 + r_1)(1 + r_2)\dots(1 + r_T)} - 1$$

Where r indicates return and $1, 2, \dots, T$ are time periods.

4. A mutual fund is a special type of investment institution which acts as investment conduit. It collects or pool the savings of the community and invests large funds in a fairly large and well diversified portfolio of sound investments.

5. The performance measures assess the overall performance of a portfolio or fund. Eugene Fama has provided an analytical framework that allows a detailed breakdown of a funds performance into the source or components performance. This is known as the Fama decomposition of total return.

6. The performance measure developed by Jack Treynor is referred to as Treynor ratio or reward to volatility ratio. It is concerned with systematic risk (or beta) and therefore, it is the relationship between reward or risk premium to the volatility of return as measured by the portfolio beta. The formula for calculating Treynor index may be stated as follows,

$$T_p = \frac{\text{Risk premium}}{\text{Portfolio's } \beta} = \frac{\bar{r}_p - r_f}{\beta_p}$$

7. The performance measure developed by William Sharpe is referred to as the sharpe ratio or the reward to variability ratio. It is the ratio of the reward or risk premium to the variability of return or risk as measured by the standard deviation of return. The formula for calculating sharpe ratio may be stated as,

$$S_p = \frac{\text{Risk premium}}{\text{Total risk}} = \frac{\bar{r}_p - r_f}{\sigma_p}$$

FACULTY OF MANAGEMENT

MBA (CBCS) IV-Semester Examination

May/June - 2019

INVESTMENT MANAGEMENT

Paper – MB – 404 – 1 (Finance)

(Elective – III – Finance)

Time: 3 Hours	Max. Marks: 80

*Note: Answer All the Questions from **Part-A** and **Part-B***

*Each question carries 4 marks in **Part-A** and 12 marks in **Part-B***

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PART-A (5 × 4 = 20 Marks)

[Short Answer Type]

1. Distinguish between investment and speculation.

2. What is active and passive bond portfolio?

3. State the famous stock indicies in India.

4. State the assumptions of CAPM.

5. What are the benefits of mutual funds investment?

PART-B (5 × 12 = 60 Marks)

[Essay Answer Type]

6. (a) Explain the investment decision making process and state the sources for investment information.

OR

(b) Discuss various approaches for investment analysis to a prospective investor.

7. (a) The Ex-Post returns on a stock are as below:

Year	% Returns
2017	15 – 14
2016	13 – 14
2015	14 – 13
2014	13 – 12
2013	12 – 13
2012	11 – 12

You are required to find the mean return and risk of the stock.

OR

(b) Calculate the duration for Bond A and B with 7 percent and 8 percent coupons having maturity period of 4 years. The face value is ₹ 1000. Both the bonds are currently yielding 6 percent.

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8.   (a)   Three stocks X, Y & Z have the following data.

Stocks	Returns	Total Risk
X	16 %	8 %
Y	20 %	10 %
Z	14 %	11 %

The correlation co-efficients between the returns of each pair of stocks are given in the following matrix.

	X	Y	Z
X	1.00	- 0.68	0.18
Y	- 0.68	1.00	- 0.39
Z	0.18	- 0.39	1.00

Find the risk and return of the portfolio created by investing 35%, 45% and 20% of the funds in X, Y & Z stocks respectively.

OR

(b)   Mr. Kishore has bought a stock that has paid ₹ 3 as dividend per share during the last year. He expects two situations either a 5 percent decline in the dividend or 5% growth in the dividend in the next year. He expected a rate of return of 20%. Determine the value of stock for both the situations.

9.   (a)   Explain in detail CAPM and APT models and present the similarities and differences between them.

OR

(b)   Stocks A and B had the following returns over the last 5 years.

Year	2013	2014	2015	2016	2017
Return of Stock A	9 %	(-) 10 %	15 %	17 %	21%
Return of Stock B	11 %	(-1) 13 %	19 %	21 %	15 %

Is it advisable to have a combination of both the stocks in a portfolio of equal proportions and what would be the returns and risk of that portfolio?

10.   (a)   Discuss the features, types and schemes of Mutual funds in India.

OR

(b)   The returns generated by the NSE. Postal savings and XYZ mutual fund are as below;

Years	Returns on NSE	Returns on Postal Savings	Returns on XYZ Mutual Fund
2017	11 %	6 %	14 %
2016	13 %	7 %	15 %
2015	14 %	6 %	16 %
2014	12 %	6 %	15 %
2013	10 %	7 %	16 %
2012	13 %	6 %	15 %

Find the Jenseins alpha of the mutual fund and state whether it had performed better than market or not.

SOLUTIONS TO MAY/JUNE-2019, QP

PART-A (5 × 4 = 20 Marks)

[Short Answer Type]

Q1. Distinguish between investment and speculation.

Answer :

For answer refer Unit-I, Page No. 1.10, Q.No. 7, Topic: Investment Vs Speculation

Q2. What is active and passive bond portfolio?

Answer :

Active Bond Portfolio

In active bond portfolio, investors actively participate in trading activities. The main objective of active bond portfolio strategies is to take advantage of variations in those factors which may have an impact on performance and value of a bond. These strategies strive to perform more effectively than market and yield more returns compare to passive investment strategy

The basic assumption of this strategy is to make bets on future interest rates and capitalize them. Such bets can yield abnormal returns only if interest rate forecasts are accurate and ability to interpret information is outstanding. However, forecast of interest rate are rarely accurate.

Passive Bond Portfolio

For answer refer Unit-II, Page No. 2.32, Q.No. 25, Topic, Passive Bond Management.

Q3. State the famous stock indicies in India.

Answer :

The famous stock indices in India are,

1. S&P CNX Nifty

2. Sensex/Bombay Stock Exchange (BSE)

3. National Stock Exchange (NSE)

1. S&P CNX Nifty

Nifty is one of the rigorously built stock market in India. It represents the price fluctuations of 50 selected stocks based on the market cap and the liquidity. Nifty has selected 1 April 1995 as the base date and 1,000 as the base value. Nifty is a value weighted index wherein weights of constituents represents the relative market caps of the companies that includes the index.

2. Sensex/Bombay Stock Exchange (BSE)

The Bombay stock exchange sensitive index, usually called as the sensex is one of the most famous followed stock market index in India. Sensex basically, indicates the fluctuations of 30 sensitive shares from particularly mentioned and other groups. Sensex is a value weighted index which considers April 1, 1979 as its base date even though it started functioning on January 1, 1986 the value calculated at 598.53 was considered as 100 as base date value upto the end of August 2003

3. National Stock Exchange (NSE)

The National Stock Exchange was started in November 1992. Its initial capital outlay was ₹ 25 crores which was subscribed by the Industrial Development Bank of India (IDBI) and co-subscribed by other lending institutions such as GIC, LIC, other insurance companies, banks and financial institutions.

Q4.   State the assumptions of CAPM.

Answer :

For answer refer Unit-IV, Page No. 4.37, Q No. 10.

Q5.   What are the benefits of mutual funds investment?

Answer :

For answer refer Unit-V, Page No. 5.8, Q No. 9, Topic: Advantages of Mutual Funds for Investors (1 to 3 Points).

PART-B (5 × 12 = 60 Marks)

[Essay Answer Type]

Q6.   (a)   Explain the investment decision making process and state the sources for investment information.

Answer :

Investment Decision Making Process

For answer refer Unit-I, Page No. 1.4, Q.No. 4.

Sources for Investment Information

For answer refer Unit-I, Page No. 1.6, Q.No. 5, Topic: Sources of Investment Information.

OR

(b)   Discuss various approaches for investment analysis to a prospective investor.

Answer :

For answer refer Unit-I, Page No. 1.29, Q No. 23

Q7.   (a)   The Ex-Post returns on a stock are as below:

Year	% Returns
2017	15 – 14
2016	13 – 14
2015	14 – 13
2014	13 – 12
2013	12 – 13
2012	11 – 12

You are required to find the mean return and risk of the stock.

Answer :

Year	% Returns	Ex-Post returns = $\dfrac{\text{ending value} - \text{beginning value}}{\text{begining value}}$
2017	15 14	6.6
2016	13 – 14	7.7
2015	14 13	7.1
2014	13 - 12	– 7.7
2013	12 13	8.3
2012	11 – 12	9.1

Mean return $(r) = \dfrac{\Sigma r}{n}$

$$= \frac{-6.6 + 7.7 - 7.1 - 7.7 + 8.3 + 9.1}{6}$$

$$= \frac{25.1 - 21.4}{6} = \frac{3.7}{6} = 0.62$$

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Mean Return = 0 62

$$Risk = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(r-\bar{r})^2}$$

$$= \sqrt{\frac{(-6.6 \quad 0.62)^2 + (7.7 \quad 0.62)^2 + (7.1 \quad 0.62)^2 + (7.7 \quad 0.62)^2 + (8.3 \quad 0.62)^2 + (9.1 \quad 0.62)^2}{6}}$$

$$= \sqrt{\frac{52.13 + 50.13 + 59.60 + 69.22 + 58.98 + 71.91}{8}}$$

$$= \sqrt{\frac{361.97}{6}} = \sqrt{60.33} = 7.77$$

Hence, mean return is 0 62 and risk is 7 77

Working Notes

Calculation of export returns

$$r = \frac{ending\ value - begining\ value}{beginning\ value} \times 100$$

For 2017 $= \frac{14-15}{15} \times 100 = -6.6$

In the same way calculate export returns for remaining years.

OR

(b) **Calculate the duration for Bond A and B with 7 percent and 8 percent coupons having maturity period of 4 years. The face value is ₹ 1000. Both the bonds are currently yielding 6 percent.**

Answer :

For answer refer Unit-II, Page No. 2.25, Q.No. 4.

Q8. (a) Three stocks X, Y & Z have the following data.

Stocks	Returns	Total Risk
X	16 %	8 %
Y	20 %	10 %
Z	14 %	11 %

The correlation co-efficients between the returns of each pair of stocks are given in the following matrix.

	X	Y	Z
X	1.00	-0.68	0.18
Y	-0.68	1.00	-0.39
Z	0.18	-0.39	1.00

Find the risk and return of the portfolio created by investing 35%, 45% and 20% of the funds in X, Y & Z stocks respectively.

Answer :

Expected return of portfolio $(r_p) = w_1r_1 + w_2r_2 + w_3r_3$

$= 0.35 \times 16\% + 0.45 \times 20\% + 0.20 \times 14\%$

$= 5.6\% + 9\% + 2.8\%$

$= 17.4$ percent

Expected risk of portfolio (σ_p)

Variance of Portfolio $(\sigma^2_p) = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + w_3^2\sigma_3^2 + 2w_1 w_2\sigma_{12} + 2w_1 w_3\sigma_{13} + 2w_2 w_3\sigma_{23}$

$= (0.35 \times 8\%)^2 + (0.45 \times 10\%)^2 + (0.20 \times 11\%)^2 + 2(-0.68) + 2(0.18) + (-0.39)$

$7.84 + 20.25 + 4.84 \quad 1.36 + 0.36 \quad 0.78$

$= 31.15$

OR

(b) Mr Kishore has bought a stock that has paid ₹ 3 as dividend per share during the last year. He expects two situations either a 5 percent decline in the dividend or 5% growth in the dividend in the next year. He expected a rate of return of 20%. Determine the value of stock for both the situations.

Answer :

Given that,

$D_0 = 3$ (Last year dividend)

$g_n = 5\%$ or 0.05

$r = 20\%$ or 0.20

Situation-1

Decline in dividend by 5 percent.

$$P_0 = \frac{D_0(1 + g_n)}{r - g_n}$$

$$= \frac{3(1 + (-0.05))}{0.20 - (-0.05)}$$

$$= \frac{3(1 - 0.05)}{0.20 + 0.05}$$

$$= \frac{3(0.95)}{0.25}$$

$$= \frac{2.85}{0.25} = 11.4$$

Value of stock when dividend decline by 5 percent is ₹ 11.4.

Situation-2

Growth in dividend by 5 percent

$$P_0 = \frac{D_0(1 + g_n)}{r - g_n}$$

$$= \frac{3(1 + 0.05)}{0.20 - 0.05}$$

$$= \frac{3(1.05)}{0.15} = \frac{3.15}{0.15} = 21$$

Value of stock when dividend grows by 5 percent is ₹ 21.

Q9. **(a)** Explain in detail CAPM and APT models and present the similarities and differences between them.

Answer :

CAPM

For answer refer Unit-IV, Page No. 4.20, Q.No. 12, Topic Capital Asset Pricing Model (CAPM)

APT

For answer refer Unit-IV Page No. 4.25, Q.No. 17, Topic Arbitrage Pricing Theory (APT)

Similarities and Differences Between APT and CAPM

For answer refer Unit-IV, Page No. 4.28, Q.No 19

OR

(b) Stocks A and B had the following returns over the last 5 years.

Year	2013	2014	2015	2016	2017
Return of Stock A	9 %	(-) 10 %	15 %	17 %	21%
Return of Stock B	11 %	(-1) 13 %	19 %	21 %	15 %

Is it advisable to have a combination of both the stocks in a portfolio of equal proportions and what would be the returns and risk of that portfolio?

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Answer :

For answer refer Unit-IV, Page No. 4.32, Q.No. 3, (Exclude Topic Coefficient of Correlation).

Hence, it is advisable to have a combination of both the stocks in equal proportion in a portfolio as covariance between stock r_A and r_B is positive which indicates that both move in same direction. The correlation co-efficient of both the stocks is positive which indicates that correlation is very strong.

Expected Return of the Portfolio

Given proportion i.e 50% of A and 50% of B. Combined portfolio return can be calculated using the following formula.

$$R_p = \sum_{i=1}^{A} w_i R_i$$

$$R_p = W_A R_A + W_B R_B$$
$$= (0.5 \times 10.4) + (0.5 \times 10.6)$$
$$= 5.2 + 5.3$$
$$= 10.5$$

.. Expected Returns of the portfolio (R_p) = 10.5%

Expected Risk of the Portfolio (σ_p)

Portfolio Risk $(\sigma_p) = \sqrt{\sigma_A^2 w_A^2 + \sigma_B^2 w_B^2 + 2w_A.w_B (\rho_{AB}.\sigma_A.\sigma_B)}$
$$= \sqrt{(10.91)^2 \times (0.5)^2 + (12.29)^2 \times (0.5)^2 + 2(0.5)(0.5)(0.95 \times 10.91 \times 12.29)}$$
$$= \sqrt{(119.02 \times 0.25) + (151.04 \times 0.25) + 0.5(127.38)}$$
$$= \sqrt{29.75 + 37.76 + 63.69}$$
$$= \sqrt{131.2}$$
$$= 11.45$$

. Portfolio Risk (σ_p) = 11.45

Q10. (a) Discuss the features, types and schemes of Mutual funds in India.

Answer :

Features of Mutual Funds

For answer refer Unit-V, Page No. 5.13, Q.No. 5, Topic Features of Mutual Funds.

Types of Mutual Funds

For answer refer Unit-V, Page No. 5.14, Q.No. 6.

Schemes of Mutual Funds

For answer refer Unit-V, Page No. 5.15, Q No. 7.

<div align="center">OR</div>

(b) The returns generated by the NSE, Postal savings and XYZ mutual fund are as below;

Years	Returns on NSE	Returns on Postal Savings	Returns on XYZ Mutual Fund
2017	11 %	6 %	14 %
2016	13 %	7 %	15 %
2015	14 %	8 %	16 %
2014	12 %	6 %	15 %
2013	10 %	7 %	16 %
2012	13 %	8 %	15 %

Find the Jenseins alpha of the mutual fund and state whether it had performed better than market or not.

Answer 1

Jensen's Performance Measure

The formula of Jensen's performance measure is $R_p - R_f = \alpha + \beta(R_m - R_f)$

Ordinary least squares regression must be used to find Jensen's alpha of the mutual fund.

Let $(R_p - R_f) = Y$ and $(R_m - R_f) = X$

Following equation must be computed by using the formula,

$$\overline{Y} = A + B\overline{X}$$

Where, $\overline{Y} = \dfrac{\Sigma Y}{N}$ and $\overline{X} = \dfrac{\Sigma X}{N}$

Beta can calculated as,

$$B = \dfrac{N\Sigma XY - \Sigma X \Sigma Y}{N\Sigma X^2 - (\Sigma X)^2}$$

Years	Returns on NSE (R_m)	Returns on XYZ Mutual Fund (R_p)	Returns on Postal Savings (R_f)	X ($R_m - R_f$)	Y ($R_p - R_f$)	X × Y	X²
2017	11%	14%	6%	5%	8%	40	25
2016	13%	15%	7%	6%	8%	48	26
2015	14%	16%	6%	8%	10%	80	64
2014	12%	15%	6%	6%	9%	54	36
2013	10%	16%	7%	3%	9%	27	9
2012	13%	15%	6%	7%	9%	63	49
				$\Sigma X = 35$	$\Sigma Y = 53$	$\Sigma XY = 312$	$\Sigma X^2 = 219$

$$B = \dfrac{N\Sigma XY - \Sigma X \Sigma Y}{N\Sigma X^2 - (\Sigma X)^2}$$

$$= \dfrac{6(312) - (35)(53)}{6(219) - (35)^2}$$

$$= \dfrac{1872 - 1855}{1314 - 1225}$$

$$= \dfrac{17}{89}$$

$$= 0.19$$

$Y = \dfrac{53}{6} = 8.83 \quad X = \dfrac{35}{6} = 5.83$

$\overline{Y} = A + B\overline{X}$

$A = \overline{Y} - B\overline{X}$

$A = 8.83 - (0.19)(5.83)$

$= 8.83 - 1.107$

$= 7.723$

Since alpha is positive (A = 7.723), the mutual fund outperformed the market on risk adjusted basis over the specific period.

FACULTY OF MANAGEMENT

MBA (CBCS) IV-Semester Examination

May/June- 2018

INVESTMENT MANAGEMENT

Paper – MB – 404 – I

(Elective – III – Finance)

Time: 3 Hours	Max. Marks 80

Note: Answer All the Questions from Part-A and Part-B

Each question carries 4 marks in Part-A and 12 marks in Part-B

- - -

PART-A (5 × 4 = 20 Marks)

(Short Answer Type)

1. State the investment decision process.

2. What are features of debt instruments and state its types?

3. State the uses of Security Market Indexes.

4. How to determine portfolio return and risk?

5. State types of mutual funds.

PART-B (5 × 12 = 60 Marks)

(Essay Answer Type)

6. (a) Discuss the factors influencing for investment decision for a rationale investor

OR

(b) Explain the elements in fundamental analysis

7. (a) The ex-ante returns on a fund are estimated as below.

% Returns	11.23	14.64	13.21	9.86	10.11	9.56
Probability	0.1	0.1	0.1	0.2	0.3	0.2

You are required to find the return and risk of the fund.

OR

(b) Consider a bond selling at a par value of ₹ 1,000 with 7 years to maturity and 8% coupon payment, if the yield to maturity is 9% find the duration of bond when the coupon are paid annually and semi-annually.

8. (a) The latest dividend paid on an equity share is ₹ 3.45 per share these dividends have been growing at a constant rate of 6.7% per annum and are likely to grow at this rate till long discount future. The required rate of return is 11.12%. You are required to find its intrinsic value today, after two years and after 5 years.

OR

(b) Mr Ashok wants to purchase a stock and hold on it for 5 years He estimates that ₹ 4 dividend would be paid by the company for the next five years. He hopes to sell the shares at ₹ 60 at the end of the fifth year His required rate of return is 10%. What is the present price?

9.   (a) Explain the assumptions and applicability capital asset pricing model in portfolio selection.

<p align="center">OR</p>

(b) Assume your self as a portfolio manager and with the help of the following details, state the securities that are over priced or under priced in terms of the security market line.

Security	Expected Return	Beta	Standard Deviation
A	0.33	1.7	0.50
B	0.13	14	0.35
C	0.26	11	0.40
D	0.12	0.95	0 24
E	0.21	1.05	0 28
F	0.14	0.70	0.18
Nifty Index	0.13	1.00	0.20
T-Bills	0.09	0.00	0.00

10.   (a) Discuss the problems and prospects of Mutual Fund Investments in India

<p align="center">OR</p>

(b) With the following details evaluate the performance of the different funds by using Sharpe, Treynor and Jensen methods with $R_f = 5\%$.

Funds	Return	Standard Deviation	Beta
A	2	20	0.98
B	12	18	0.97
C	8	22	1 17
D	9	24	1.22
Market	10	20	1 00

SOLUTIONS TO MAY/JUNE-2018, QP

PART-A (5 × 4 = 20 Marks)

(Short Answer Type)

Q1. State the investment decision process.

Answer :

For answer refer Unit-I, Page No. 1.46, Q No. 4.

Q2. What are features of debt instruments and state its types?

Answer :

Features of Debt Instruments

For answer refer Unit-II, Page No. 2.41, Q.No. 6.

Types of Debt Instruments

For answer refer Unit-II, Page No. 2.41, Q No. 5

Q3. State the uses of Security Market Indexes.

Answer :

For answer refer Unit-III, Page No. 3.23, Q No. 15, Topic Uses of Security Market Indexes (6th Paragraph Only).

Q4. How to determine portfolio return and risk?

Answer :

For answer refer Unit-IV, Page No. 4.36, Q.No. 9.

Q5. State types of mutual funds.

Answer :

For answer refer Unit-V, Page No. 5.29, Q No. 9

PART-B (5 × 12 = 60 Marks)

(Essay Answer Type)

Q6. (a) Discuss the factors influencing for investment decision for a rationale investor.

Answer :

For answer refer Unit-I, Page No 1.10, Q.No. 8, Topic: Factors to be Considered While Making an Investment.

OR

(b) Explain the elements in fundamental analysis.

Answer :

For answer refer Unit-I, Page No. 1.33, Q No. 25, Topic Components of Fundamental Analysis.

Q7. (a) The ex-ante returns on a fund are estimated as below.

Returns	11.23	14.64	13.21	9.86	10.11	9.56
Probability	0.1	0.1	0.1	0.2	0.3	0.2

You are required to find the return and risk of the fund.

Answer :

Calculation of Expected Return

Expected return $(\eta) = \sum p_i r_i$

% Returns (r$_i$)	Probability (p$_i$)	p$_i$ r$_i$
11.23	0.1	1.123%
14.64	0.1	1.464%
13.21	0.1	1.321%
9.86	0.2	1.972%
10.11	0.3	3.033%
9.56	0.2	1.912%
Total (η)		10.825%

Calculation of Risk

$$Risk = \Sigma p_i (r_i - \eta)^2$$

Return (r$_i$)	Probability (p$_i$)	P$_i$ r$_i$	$\eta - \eta$ (r$_i$ –10.825)	P$_i$ (n – n)^2
11.23	0.1	1.123	0.405	0.016
14.64	0.1	1.464	3.815	1.455
13.21	0.1	1.321	2.385	0.569
9.86	0.2	1.972	(0.965)	0.186
10.11	0.3	3.033	(0.715)	0.153
9.56	0.2	1.912	(1.265)	0.320
Total Risk				2.699

Hence expected return is 10.825%

Expected risk is 2.699

OR

(b) Consider a bond selling at a par value of ₹ 1,000 with 7 years to maturity and 8% coupon payment, if the yield to maturity is 9% find the duration of bond when the coupon are paid annually and semi-annually.

Answer :

Given that,

Value of bond = ₹ 1,000

Maturity period = 7 years

Coupon rate = 8%

Yield to maturity = 9%

Duration of bond when coupon is paid annually

$$D = \frac{\dfrac{CF \times 1}{(1+r)^1} + \dfrac{CF \times 2}{(1+r)^2} + \dfrac{CF \times 3}{(1+r)^3} + \dfrac{CF \times 4}{(1+r)^4} + \dfrac{CF \times 5}{(1+r)^5} + \dfrac{CF \times 6}{(1+r)^6} + \dfrac{CF \times 7}{(1+r)^7}}{\dfrac{CF_1}{(1+r)^1} + \dfrac{CF_2}{(1+r)^2} + \dfrac{CF_3}{(1+r)^3} + \dfrac{CF_4}{(1+r)^4} + \dfrac{CF_5}{(1+r)^5} + \dfrac{CF_6}{(1+r)^6} + \dfrac{CF_7}{(1+r)^7}}$$

$$= \frac{\dfrac{80 \times 1}{(1.09)^1} + \dfrac{80 \times 2}{(1.09)^2} + \dfrac{80 \times 3}{(1.09)^3} + \dfrac{80 \times 4}{(1.09)^4} + \dfrac{80 \times 5}{(1.09)^5} + \dfrac{80 \times 6}{(1.09)^6} + \dfrac{1080 \times 7}{(1.09)^7}}{\dfrac{80}{(1.09)^1} + \dfrac{80}{(1.09)^2} + \dfrac{80}{(1.09)^3} + \dfrac{80}{(1.09)^4} + \dfrac{80}{(1.09)^5} + \dfrac{80}{(1.09)^6} + \dfrac{1080}{(1.09)^7}}$$

$$= \frac{73.39 + 134.67 + 185.32 + 226.70 + 259.97 + 286.21 + 4135.58}{73.39 + 67.33 + 61.77 + 56.67 + 51.99 + 47.70 + 590.79}$$

$$= \frac{530.84}{949.64}$$

$$= 5.58 \text{ years}$$

Duration of bond when coupon is paid semi annually:

t	CF$_t$	$\dfrac{1}{(1+0.045)^{2t}}$	$\dfrac{CF}{(1+0.045)^{2t}}$	$\dfrac{CF \times t}{(1+0.045)^{2t}}$
(1)	(2)	(3)	(4) = (2) × (3)	(5) = (4) × t
0.5	40	0.9569	38.28	19.14
1	40	0.9157	36.63	36.63
1.5	40	0.8763	35.05	52.58
2	40	0.8386	33.54	67.08
2.5	40	0.8024	32.10	80.25
3	40	0.7679	30.72	92.16
3.5	40	0.7348	29.39	102.86
4	40	0.7032	28.13	112.52
4.5	40	0.6729	26.92	121.14
5	40	0.6439	25.76	128.8
5.5	40	0.6162	24.65	135.6
6	40	0.5897	23.59	141.54
6.5	40	0.5643	22.57	146.70
7	1040	0.5399	561.50	3930.5
			948.83	5167.5

$$D = \dfrac{5167.5}{948.83}$$
$$= 5.45 \text{ years}$$

Q8. **(a)** The latest dividend paid on an equity share is ₹ 3.45 per share these dividends have been growing at a constant rate of 6.7% per annum and are likely to grow at this rate till long discount future. The required rate of return is 11.12%. You are required to find its intrinsic value today, after two years and after 5 years.

Answer :

Given that,

Latest dividend = ₹ 3.45

Required rate of return = 11.12%

Growth rate (constant) = 6.7%

(i) Calculation of intrinsic value of equity share today

$$S_0 = \dfrac{D_0(1+g)}{k-g} = \dfrac{3.45(1+0.067)}{0.1112-0.067}$$

$$= \dfrac{3.68}{0.0442} = ₹ 83.26$$

(ii) Calculation of intrinsic value of equity share after two years,

$$S_2 = \dfrac{D_0(1+g)^2}{k-g} = \dfrac{3.45(1+0.067)^2}{0.1112-0.067}$$

$$= \dfrac{3.45(1.138)}{0.0442}$$

$$= \dfrac{3.9261}{0.0442} = ₹ 88.83$$

(iii) Calculation of intrinsic value of equity share after 5 years

$$S_5 = \dfrac{D_0(1+g)^5}{k-g} = \dfrac{3.45(1+0.067)^5}{0.1112-0.067}$$

$$= \dfrac{3.45(1.383)}{0.0442}$$

$$= \dfrac{4.771}{0.0442} = ₹ 107.94$$

OR

(b) Mr. Ashok wants to purchase a stock and hold on it for 5 years. He estimates that ₹ 4 dividend would be paid by the company for the next five years. He hopes to sell the shares at ₹ 60 at the end of the fifth year. His required rate of return is 10%. What is the present price?

Answer :

Present value of stock $(S_0) = \dfrac{D_1}{(1+k)^1} + \dfrac{D_2}{(1+k)^2} + \dfrac{D_3}{(1+k)^3} + \ldots\ldots + \dfrac{D_n + S_n}{(1-k)^n}$

Given that,

$D_1, D_2, D_3, \ldots ..D_n$ = Annual dividends = ₹ 4 (constant)

S_n = Sale price at end of holding period = ₹ 60

k = Required rate of return = 10%

n = holding period in years = 5 years

$S_0 = \dfrac{4}{(1+0.10)^1} + \dfrac{4}{(1+0.10)^2} + \dfrac{4}{(1+0.10)^3} + \dfrac{4}{(1+0.10)^4} + \dfrac{64}{(1+0.10)^5}$

= 3.64 + 3.31 + 3.01 + 2.73 + 39.74

= ₹ 52.43

Q9. (a) Explain the assumptions and applicability capital asset pricing model in portfolio selection.

Answer :

Assumptions of Capital Asset Pricing Model

For answer refer Unit-IV, Page No. 4.21, Q.No. 12, Topic: Assumptions of CAPM.

Applicability of Capital Asset Pricing Model

For answer refer Unit-IV, Page No. 4.21, Q.No. 13, Topic: Advantages/Applicability of CAPM.

OR

(b) Assume your self as a portfolio manager and with the help of the following details, state the securities that are over priced or under priced in terms of the security market line.

Security	Expected Return	Beta	Standard Deviation
A	0.33	1.7	0.50
B	0.13	1.4	0.35
C	0.26	1.1	0.40
D	0.12	0.95	0.24
E	0.21	1.05	0.28
F	0.14	0.70	0.18
Nifty Index	0.13	1.00	0.20
T-Bills	0.09	0.00	0.00

Answer :

The return on the SML can be estimated with the help of the following formula.

$r_i = r_f + \beta_i (r_m - r_f)$

So, estimated return for security A will be,

$r_A = r_f + \beta_A (r_m - r_f)$

= 0.09 + 1.7 (0.13 - 0.09)

= 0.158

Likewise, the return on SML of other securities is estimated and tabulated as follows,

Security Return	Expected Return	Estimated	Remarks
A	0.33	0 158	Underpriced
B	0 13	0 146	Overpriced
C	0.26	0.134	Underpriced
D	0 12	0.128	Overpriced
E	0 21	0.132	Underpriced
F	0 14	0.118	Underpriced

Q10. (a) Discuss the problems and prospects of Mutual Fund Investments in India.

Answer :

For answer refer Unit-V, Page Nos. 5.22, 5.23, Q.No. 16, Topics: Problems of Mutual Funds in India, Prospects of Mutual Funds in India

OR

(b) With the following details evaluate the performance of the different funds by using Sharpe, Treynor and Jensen methods with $R_f = 5\%$.

Funds	Return	Standard Deviation	Beta
A	2	20	0.98
B	12	18	0.97
C	8	22	1.17
D	9	24	1.22
Market	10	20	1.00

Answer :

$$\text{Sharpe Measure} = \frac{R_P - R_f}{\sigma_p}$$

$$\text{Fund } A = \frac{2-5}{20} = \frac{-3}{20}$$

$$= -0.15$$

$$\text{Fund } B = \frac{12-5}{18} = \frac{7}{18}$$

$$= 0.39$$

$$\text{Fund } C = \frac{8-5}{22} = \frac{3}{22}$$

$$= 0.14$$

$$\text{Fund } D = \frac{9-5}{24} = \frac{4}{24}$$

$$= 0.17$$

$$\text{Market} = \frac{10-5}{20}$$

$$= \frac{5}{20} = 0.25$$

$$\text{Treynor Measure} = \frac{\bar{R}_p - R_f}{\beta_p}$$

$$\text{Fund } A = \frac{2-5}{0.98} = \frac{3}{0.98}$$

$$= -3 06$$

$$\text{Fund } B = \frac{12-5}{0.97} = \frac{7}{0.97}$$

$$= 7.22$$

$$\text{Fund } C = \frac{8-5}{1 17} = \frac{3}{1 17}$$

$$= 2.56$$

$$\text{Fund } D = \frac{9-5}{1 22} = \frac{4}{1.22}$$

$$= 3.28$$

$$\text{Market} = \frac{10-5}{1 00}$$

$$= \frac{5}{1 00} = 5$$

$$\text{Jensen Measure} = \bar{R}_p - [R_f + \beta_p (\bar{R}_m - R_f)]$$

$$\bar{R}_m = \text{Market Index}$$

$$\text{Fund } A = 2 - [5 + 0.98 (10 - 5)]$$

$$= 2 - [5 + 0.98 (5)]$$

$$= 2 - [5 + 4.9]$$

$$= 2 - 9.9$$

$$= -7 9$$

$$\text{Fund } B = 12 - [5 + 0 97 (10 - 5)]$$

$$= 12 - [5 + 0 97 (5)]$$

$$12 - [5 + 4 85]$$

$$= 12 - 9 85$$

$$= 2 15$$

$$\text{Fund } C = 8 - [5 + 1.17 (10 - 5)]$$

$$= 8 - [5 + 1.17 (5)]$$

$$= 8 - 10.85$$

$$= -2.85$$

$$\text{Fund } D = 9 - [5 + 1.22 (10 - 5)]$$

$$= 9 - [5 + 1.22 (5)]$$

$$= 9 - [5 + 6.1]$$

$$= -2.1$$

Market = 0 [By definition].

INVESTMENT MANAGEMENT

Time: 3 Hours	Max. Marks. 80

Note :   Answer all the questions from **Part-A** and **Part-B**

Each question carries **4** marks in **Part-A** and 12 marks in **Part-B.**

PART-A (5 × 4 = 20 Marks)

(Short Answer Type)   *Solutions*

1.	Real Assets Vs Financial Assets.	(Unit-I / Page No. 1.45 / 01)
2.	HPR and YTM	(Unit-II / Page No. 2.48 / 03)
3.	Price Earnings Ratio	(Unit-III / Page No. 3.31 / 01)
4.	Security Market Line	(Unit-IV / Page No. 4.34 / 01)
5.	Open Ended Funds	(Unit-V / Page No. 5.27 / 01)

PART-B (5 × 12 = 60 Marks)

(Essay Answer Type)

6. (a) What are the various forms of investment alternatives? Give a
         detailed account of any five.   (Unit-I / Page No. 1.2 / 02)

                                    OR

    (b) Define risk and distinguish between systematic and unsystematic risk.   (Unit-I / Page No. 1.23 / 010)

7. (a) What are fixed income securities? What are the different types of
         fixed income securities in India?   (Unit-II / Page No. 2.2 / 01)

                                    OR

    (b) Calculate the duration for bond 'A' and bond 'B' with 7% and 8%
         coupons having a maturity period of 4 years. The face value of the
         bonds are ₹ 1000/- and both the bonds are currently yielding 6%.
         Which one is advisable and why?   (Unit-II / Page No. 2.25 / Problem No. 4)

8. (a) Explain various approaches of common stock valuation.   (Unit-III / Page No. 3.3 / 02)

                                    OR

    (b) Explain the Whitbeck Kisor Model in stock valuation.   (Unit-III / Page No. 3.9 / 08)

9. (a) Ansari got the following information regarding his favorite stocks.
         He wants to invest in all the four stocks equally

Stocks	α	β	σ
1	1.27	1.50	50
2	1.02	1.05	40
3	2.48	1.37	20
4	0.47	0.86	36

The market variance is 25 and expected return is 20%

(i) What would be Ansari's portfolio return and risk?

(ii) Can you advise him regarding the amount to be allocated on each security so as to enhance his earnings?   (Unit-IV / Page No. 4.2 / Problem No. 1)

OR

(b) Define Markowitz diversification. Explain the statistical method used by Markowitz to obtain the risk reducing benefit.   (Unit-IV / Page No. 4.10 / Q4)

10. (a) From the following information, rank these mutual funds based on Sharpe's and Traynor's methods,

Mutual Funds	Average Annual Return	Standard Deviation	Correlation with Market
A	18	27	0.8
B	14	18	0.6
C	15	8	0.9
Market	13	12	-

Risk free rate of interest is 9.   (Unit-V / Page No. 5.5 / Problem No. 3)

OR

(b) Explain about the problems and prospects of Indian mutual fund industry. State and explain how they are less risky than investments in stocks   (Unit-V / Page No. 5.22 / Q15)

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MODEL PAPER |2

FACULTY OF MANAGEMENT

MBA (CBCS) IV-Semester Examinations

Model Paper-II

INVESTMENT MANAGEMENT

Time: 3 Hours   Max. Marks: 80

Note :   Answer all the questions from **Part-A** and **Part-B**

Each question carries 4 marks in **Part-A** and 12 marks in **Part-B**.

PART-A (5 × 4 = 20 Marks)

(Short Answer Type)

Solutions

1.	Deep Discount Bonds	(Unit-II / Page No. 2.39 / Q1)
2.	Free Cash Flows	(Unit-III / Page No. 3.31 / Q2)
3.	Net Asset Value	(Unit-V / Page No. 5.27 / Q2)
4.	Ex-post Return Vs Ex-ante Return	(Unit-I / Page No. 1.47 / Q3)
5.	Capital Market Line Vs Security Market Line	(Unit-IV / Page No. 4.35 / Q5)

PART-B (5 × 12 = 60 Marks)

(Essay Answer Type)

6.   (a)   Explain various causes of risk.   (Unit-I / Page No. 1.22 / Q10)

OR

(b)   A company manages a stock fund consisting of fund stocks with the following market values and betas.

Stock	Market Value	Beta
P	1,00,000	1.10
Q	50,000	1.20
R	75,000	0.75
S	1,25,000	0.80
T	1,50,000	1.40
	5,00,000	

Calculate beta of the portfolio.   (Unit-I / Page No. 1.26 / Problem No. 1)

7.   (a)   Mr. Sagar is considering the purchase of a bond currently selling at ₹ 878.50. The bond has four years to maturity with a face value of ₹ 1000/- and 8% coupon rate. The next annual interest payment is due after one year from today. The required rate of return is 10%

(i)   Calculate the intrinsic value of the bond. Should Sagar buy the bond?

(ii)   Calculate the YTM of the bond.   (Unit-II / Page No. 2.15 / Problem No. 5)

OR

(b)   Describe various theories proposed for understanding the term structure of interest rates.   (Unit-II / Page No. 2.27 / Q20)

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8. (a) Explain the significance of P/E ratio in equity valuation.   (Unit-III / Page No. 3.8 / Q7)

OR

(b) The returns of Fashions Ltd. At present is 21%. This assumed to be
continued for the next 5 years and after that is assumed to have a
growth rate of 10% indefinitely. The dividend paid for the current year
is ₹3.2/-. The required rate of return is 20% and the present price is
₹57/-. What is the estimated price according to two stage model.
Should you purchase the bond?   (Unit-III / Page No. 3.11 / Problem No. 3)

9. (a) Explain the Sharpe index model. How does it differ from the
Markowitz model?   (Unit-IV / Page No. 4.15 / Q8)

OR

(b) Mention the assumptions underlying the standard Capital Asset
Pricing Model (CAPM). Despite its limitations, why is the CAPM
widely used?   (Unit-IV / Page No. 4.21 / Q13)

10. (a) Consider the following information for three mutual funds A, B and C
and the market.

Stock	Mean Return	Standard Deviation	Beta
A	15%	20%	0.90
B	17%	24%	1.10
C	19%	27%	1.20
Market Index	15%	20%	1.00

The mean risk-free rate was 10 per cent. Calculate sharpe's measure, treynors
measure and Jensens measures for the three funds and for the market index.

(Unit-V / Page No. 5.7 / Problem No. 1)

OR

(b) The data related to a mutual fund trust is as follows.

Scheme Name	XYZ
Scheme size	₹ 20 lacs
Face value of units	₹ 10
Value of investments	+ ₹ 10.00 lacs
Receivables	+ ₹ 0.75 lacs
Accrued income	+ ₹ 0.25 lacs
Other current assets	+ ₹ 3.00 lacs
Liabilities	- ₹ 2.25 lacs
Accrued expenses	- ₹ 0.50 lacs

Calculate the NAV of the above mutual fund.   (Unit-V / Page No. 5.19 / Problem No. 1)

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FACULTY OF MANAGEMENT

MBA (CBCS) IV-Semester Examinations

Model Paper-III

INVESTMENT MANAGEMENT

Time: 3 Hours   Max. Marks 80

Note :   Answer all the questions from **Part-A** and **Part-B**.

Each question carries 4 marks in **Part-A** and 12 marks in **Part-B**.

PART-A (5 × 4 = 20 Marks)

(Short Answer Type)

Solutions

1.   Types of Mutual Funds   (Unit-V / Page No. 5.29 / 09)

2.   How to determine portfolio return and risk?   (Unit-IV / Page No. 4.30 / 08)

3.   Dividend Discounted Models   (Unit-III / Page No. 3.31 / 03)

4.   Bond Duration   (Unit-II / Page No. 2.41 / 04)

5.   Co-efficient of Variation   (Unit-I / Page No. 1.46 / 05)

PART-B (5 × 12 = 60 Marks)

(Essay Answer Type)

6.   (a)   Explain the various approaches to investment analysis.   (Unit-I / Page No. 1.29 / 023)

OR

(b)   Define Behavioural Finance. How do you evaluate the behavioural critique?   (Unit-I / Page No. 1.40 / 032)

7   (a)   Explain briefly about various bond price theorems.   (Unit-II / Page No. 2.18 / 012)

OR

(b)   The Madsoft Company recently issued a ₹ 1000, 12% semiannual
bond with 20 years of maturity (a) What will be the price of the bond,
if the market rate of interest is 14%? (b) Determine the bond's
Macaulay's duration when it was issued and (c) Two years later.   (Unit-II / Page No. 2.34 / Problem No. 5)

8.   (a)   What are the various measures of relative value? Explain.   (Unit-III / Page No. 3.17 / 011)

OR

(b)   Describe briefly the Bombay Stock Exchange Sensitive Index
(SENSEX) and the S&P CNX Nifty Index (Nifty) and their
computational procedure.   (Unit-III / Page No. 3.27 / 021)

9.   (a)   Stocks X & Y have yielded the following returns for the past 6 years.

	Return (%)	
Years	X	Y
1ˢᵗ year	12	14
2ⁿᵈ year	18	12

Years	Return X	Return Y
1	12%	22%
2	18%	18%
3	14%	14%
4	22%	10%
5	15%	12%
6	20%	18%

What is the expected return and risk of a portfolio made up of 60% of X and 40% of Y?

(Unit-IV / Page No. 4.7 / Problem No. 6)

OR

(b) Stock X and Y had the following returns over the past 5 years.

Year	2009	2010	2011	2012	2013
Return on X (%)	9	~10	15	17	21
Return on Y (%)	11	−13	19	21	15

Is it advisable to have a combination of both the stock in a portfolio?

(Unit-IV / Page No. 4.32 / Problem No. 3)

10. (a) Explain about the various methods of calculating returns on mutual funds.   (Unit-V / Page No. 5.21 / Q13)

OR

(b) Explain about the regulatory authority which protects the investors interest in India.   (Unit-V / Page No. 5.28 / Q18)

ESSAY QUESTIONS

Q1. Differentiate between real and financial assets.

Answer : *Important Question*

For answer refer Unit-1, Page No. 1.3, Q.No. 3

Q2. What is investment process? Describe briefly the different steps involved in investment decisions.

Answer : *May/June-13, Q2(a)*

For answer refer Unit-1, Page No. 1.4, Q.No. 4

Q3. Explain risk and return with reference to investment.

Answer : *Important Question*

For answer refer Unit-1, Page No. 1.13, Q.No. 12

Q4. Explain various causes of risk.

OR

What are the root sources of risk?

Answer : *Important Question*

For answer refer Unit-1, Page No. 1.22, Q.No. 16

Q5. Define risk and distinguish between systematic and unsystematic risk.

Answer : *May/June-16, Q2(b)*

For answer refer Unit-1, Page No. 1.23, Q.No. 18

Q6. What is investment? Explain the different factors to be considered in investment decision.

Dec.-14, Q2(a)

OR

Explain the factors that are being considered while taking investment decisions. *Important Question*

OR

Explain the influencing factors for investment decision. *Dec.-13, Q2(a)*

OR

Discuss the factors to be considered in investment decision.

Answer : *May/June-13, Q2(a)*

For answer refer Unit-1, Page No. 1.10, Q.No. 8

SHORT QUESTIONS

Q1. Real Assets Vs Financial Assets.

Answer : *(April-17, Q1(a), May/June-16, Q1(a))*

For answer refer Unit-1, Page No. 1.45, Q.No. 1.

Q2. Ex-post Return Vs Ex-ante Return *May/June-13, Q1(b)*

OR

Ex-ante and Ex-post Returns *April-15, Q1(b)*

OR

What is Ex-ante and Ex-post returns?

Answer : *Dec.-13, Q1(b)*

For answer refer Unit-1, Page No. 1.47, Q.No. 9

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Unit-2

ESSAY QUESTIONS

Q1. What are fixed income securities? What are the different types of fixed income securities in India?

Answer :   *Important Question*

For answer refer Unit-II, Page No. 2.2, Q.No. 1.

Q2. What are the factors that influences the value of debt instruments?

Answer :   *Important Question*

For answer refer Unit-II, Page No. 2.5, Q.No. 4.

Q3. Explain the significance of bond portfolio management and state various types of bonds.

Answer :   *April-15, Q3(a)*

For answer refer Unit-II, Page No. 2.6, Q.No. 8.

Q4. A ₹ 1000 par value bond bears a coupon rate of 14% and matures after 10 years. Interest is payable semi-annually. Compute the value of the bond if the required rate of return is 16%. Determine the yield-to-maturity if it is purchased for ₹ 1100 and is held till its maturity by an investor.

Answer :   *Dec.-14, Q3(b)*

For answer refer Unit-II, Page No. 2.11, Problem No. 2.

Q5. Mr. Sagar is considering the purchase of a bond currently selling at ₹ 878.50. The bond has four years to maturity with a face value of ₹ 1000/- and 8% coupon rate. The next annual interest payment is due after one year from today. The required rate of return is 10%.

    (i)   Calculate the intrinsic value of the bond. Should Sagar buy the bond?

    (ii)   Calculate the YTM of the bond.

Answer :   *May/June-16, Q3(b)*

For answer refer Unit-II, Page No. 2.15, Problem No. 6.

Q6. Explain the method for valuing debenture that is compulsorily convertible (partially or fully) into equity shares.

Answer :   *April/May-11, Q3(a)*

For answer refer Unit-II, Page No. 2.19, Q.No. 13

Q7. Calculate the duration for bond 'A' and bond 'B' with 7% and 8% coupons having a maturity period of 4 years. The face value of the bonds are ₹. 1000/- and both the bonds are currently yielding 6%. Which one is advisable and why?

Answer :   *(Dec.-15, Q3(a) | April/May-14, Q3(b))*

For answer refer Unit-II, Page No. 2.25, Problem No. 4

Q8. Describe briefly about the active and passive bond portfolio management strategies. *Important Question*

<p align="center">OR</p>

Explain active and passive bond portfolio management strategies.

Answer :   *Dec.-13, Q3(a)*

For answer refer Unit-II, Page No. 2.31, Q.No. 23

SHORT QUESTIONS

Q1. What are Doji candle stick and deep discount bonds?   *Important Question*

<p align="center">OR</p>

Doji Candle Stick   *May/June-16, Q1(c)*

<p align="center">OR</p>

Deep Discount Bonds.

Answer :   *(May/June-16, Q1(d) | April-15, Q1(d) | May/June-12, Q1(g))*

For answer refer Unit-II, Page No. 2.39, Q.No. 1.

Q2. What do you mean by bond convexity, AYTM and YTC?   *Important Question*

OR

Bond Convexity   *Dec.-15, Q1(c)*

OR

AYTM and YTC

Answer :   *Dec.-15, Q1(d)*

For answer refer Unit-II, Page No. 2.39, Q.No. 2.

Unit-3

ESSAY QUESTIONS

Q1. What do you understand by common stock? Explain the various features/characteristics of common stock.

Answer :   *Important Question*

For answer refer Unit-III, Page No. 3.2, Q.No. 1

Q2. Explain various approaches of common stock valuation.   *Dec.-13, Q4(a)*

OR

Critically examine the various approaches to valuation of common stocks.

Answer :   *April/May-09, Q4(a)*

For answer refer Unit-III, Page No. 3.3, Q.No. 2.

Q3. What is price earnings multiplier approach? Explain the key determinants of the price earnings multiplier   *April/May-11, Q4(a)*

OR

Explain the significance of P/E ratio in equity valuation.

Answer :   *April-17, Q4(a)*

For answer refer Unit-III, Page No. 3.8, Q.No. 7

Q4. The current dividend on an equity share of Profile Limited is ₹ 4.00. Profile Limited is expected to enjoy an above-normal gorwth rate of 16% for 6 years. Thereafter the growth rate will fall and stabilize at 10%. Equity investors require a return of 15% from Profile's stock. What price you would like to place on the stock of the Profile Limited?

Answer :   *Dec.-14, Q4(b)*

For answer refer Unit-III, Page No. 3.9, Problem No. 1

Q5. The returns of Fashions Ltd. At present is 21%. This assumed to be continued for the next 5 years and after that is assumed to have a growth rate of 10% indefinitely. The dividend paid for the current year is ₹3.2/-. The required rate of return is 20% and the present price is ₹57/-. What is the estimated price according to two stage model. Should you purchase the bond?

Answer :   *May/June-16, Q4(b)*

For answer refer Unit-III, Page No. 3.11, Problem No. 3

Q6. Pramod Ltd. Operates a large ready made garment system in the textile industry. The current market price of the stock is ₹ 40/- and is expected to be ₹ 55/- after 3 years. The dividend per share would be ₹ 2/- for the next 3 years. Calculate the rate of return of Pramod Ltd's stock.

Answer :   *Dec.-15, Q4(b)*

For answer refer Unit-III, Page No. 3.13, Problem No. 3

Q7. What are the various measures of relative value? Explain.

Answer :   *Important Question*

For answer refer Unit-III, Page No. 3.17, Q.No. 11

Q6. Explain in detail about security market indexes. Also highlight the user of security market indexes.

Important Question

OR

"Stock market indices are the barometers of the stock market". Discuss.

Answer :   *Dec.-15, Q4(a)*

For answer refer Unit-III, Page No. 3.22, Q.No. 15

SHORT QUESTIONS

Q1. Price Earnings Ratio   *(April-17, Q1(e) | Jan.-12, Q1(h))*

OR

P/E Multiplier Approach   *May/June-16, Q1(e)*

OR

Price-Earning Multiplier   *(Dec.-15, Q1(f) | Dec.-14, Q1(f))*

OR

Earnings Multiplier Model

Answer :   *April/May-14, Q1(f)*

For answer refer Unit-III, Page No. 3.31, Q.No. 1.

Q2. What is CAPM and dividend discounted models?   *Important Question*

OR

CAPM   *Dec.-15, Q1(e)*

OR

Dividend Discounted Models

Answer :   *May/June-16, Q1(f)*

For answer refer Unit-III, Page No. 3.31, Q.No. 3

Unit-4

ESSAY QUESTIONS

Q1. Define the terms,

    (a) Portfolio

    (b) Portfolio risk and return.

Answer :   *Important Question*

For answer refer Unit-IV, Page No. 4.2, Q.No. 1.

Q2. Ansari got the following information regarding his favorite stocks. He wants to invest in all the four stocks equally.

Stocks	α	β	σ
1	1.27	1.50	50
2	1.02	1.05	40
3	2.48	1.37	20
4	0.47	0.86	36

The market variance is 25 and expected return is 20%.

    (i) What would be Ansari's portfolio return and risk?

    (ii) Can you advise him regarding the amount to be allocated on each security so as to enhance his earnings?

Answer :   *Dec.-15, Q5(b)*

For answer refer Unit-IV, Page No. 4.2, Problem No. 1

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Q3. What is Markowitz Theory? State its assumptions and significance.

Answer :   *Important Question*

For answer refer Unit-IV, Page No. 4.10, Q.No. 3.

Q4. Define Markowitz diversification. Explain the statistical method used by Markowitz to obtain the risk reducing benefit.

Answer :   *May/June-16, Q5(a)*

For answer refer Unit-IV, Page No. 4 10, Q.No. 4.

Q5. What is CAPM? Discuss its assumptions.   *Important Question*

OR

Explain the Capital Asset Pricing Model (CAPM).

Answer :   *May/June-12, Q5(a)*

For answer refer Unit-IV, Page No. 4.20, Q.No. 12.

Q6. Mention the assumptions underlying the standard Capital Asset Pricing Model (CAPM). Despite its limitations, why is the CAPM widely used?   *May/June-13, Q5(a)*

OR

Discuss the assumptions and applicability of Capital Asset Pricing Model (CAPM) under present situation.   *April/May-14, Q5(a)*

OR

Explain the assumptions and applicability of capital asset pricing model.

Answer :   *Dec.-13, Q5(a)*

For answer refer Unit-IV, Page No. 4.21, Q.No 13.

Q7. What are the similarities and differences between CAPM and APT?   *Aug./Sept.-14, Q4(a)*

OR

Compare and contrast capital asset pricing model and arbitrage pricing theory.

Answer :   *Important Question*

For answer refer Unit-IV, Page No. 4.28, Q.No. 19.

SHORT QUESTIONS

Q1. Security Market Line   *(April-17, Q1(g) | Dec.-15, Q1(g) | Dec.-14, Q1(h))*

OR

What is SML?

Answer :   *Important Question*

For answer refer Unit-IV, Page No. 4 34, Q No. 1

Q2. Arbitrage Pricing

Answer :   *April-17, Q1(h)*

For answer refer Unit-IV, Page No. 4.34, Q.No. 2.

Q3. The Law of One Price

Answer :   *May/June-16, Q1(g)*

For answer refer Unit-IV, Page No. 4.34, Q.No. 3

Q4. **Minimum Variance Portfolio** *(April/May-14, Q1(h) | May/June-13, Q1(e))*

OR

What is minimum variance portfolio?

Answer : *Dec.-12/Jan.-13, Q1(g)*

For answer refer Unit-IV, Page No. 4.35, Q. No. 6.

Q5. **CML** *April-15, Q1(g)*

OR

Capital Market Line

Answer : *May/June-12, Q1(i)*

For answer refer Unit-IV, Page No. 4.36, Q.No. 7.

Unit-5

ESSAY QUESTIONS

Q1. Consider the following information for three mutual funds A, B and C and the market.

	Mean Return	Standard Deviation	Beta
A	15%	20%	0.90
B	17%	24%	1.10
C	19%	27%	1.20
Market Index	16%	20%	1.00

The mean risk-free rate was 10 per cent. Calculate Sharpe's measure, Treynor measure and Jensen's measure for the three funds and for the market index. *May/June-13, Q6(b)*

OR

Consider the following information for three mutual funds A, B and C and the market.

Stock	Mean Return	Standard Deviation	Beta
A	15%	20%	0.90
B	17%	24%	1.10
C	19%	27%	1.20
Market Index	16%	20%	1.00

The mean risk-free rate was 10 percent. Calculate Sharpe's measure, Treynor's measure and Jensens measures for the three funds and for the market index.

Answer : *April-17, Q6(b)*

For answer refer Unit-V, Page No. 5.7, Problem No. 1

Q2. What do you mean by mutual funds? State its features, types and objectives. *Important Question*

OR

What do you mean by mutual fund? What are its features? Explain different types.

Answer : *Jan.-12, Q6(a)*

For answer refer Unit-V, Page No. 5.13, Q.No. 5

Q3. Explain about the problems and prospects of Indian mutual fund industry. State and explain how they are less risky than investments in stocks.   *Dec.-15, Q6(a)*

<div align="center">OR</div>

Discuss the problems and prospects of mutual funds in India.   *April/May-14, Q6(a)*

<div align="center">OR</div>

Explain the problems and prospects of mutual funds investment system in India.

Answer :   *Dec.-15, Q6(a)*

For answer refer Unit-V, Page No. 5.22, Q No. 16.

Q4. Explain the regulatory framework proposed by SEBI to protect the investors of mutual fund.

Important Question

<div align="center">OR</div>

Explain about the regulatory authority which protects the investors interest in India.

May/June-16, Q6(a)

<div align="center">OR</div>

Discuss the investors protection mechanism in India.

Answer :   *April-15, Q6(a)*

For answer refer Unit-V, Page No. 5.26, Q.No. 18.

SHORT QUESTIONS

Q1. Write a note on open ended funds and mutual fund.   *Important Question*

<div align="center">OR</div>

Open Ended Funds   *April-17, Q1(i)*

<div align="center">OR</div>

Mutual Funds

Answer :   *April/May-14, Q1(j)*

For answer refer Unit-V, Page No. 5.27, Q.No. 1

Q2. NAV   *April-17, Q1(i)*

<div align="center">OR</div>

Net Asset Value

Answer :   *(Dec.-15, Q1(i) Dec.-14, Q1(ii))*

For answer refer Unit-V, Page No. 5.27, Q No. 2

Q3. AMC

Answer :   *May/June-16, Q1(i)*

For answer refer Unit-V, Page No. 5.27, Q No. 3.

Q4. Exchange Traded Funds

Answer :   *May/June-16, Q1(j)*

For answer refer Unit-V, Page No. 5.27, Q No. 4

Q5. Types of Mutual Funds   *April-15, Q1(i)*

<div align="center">OR</div>

State types of mutual funds.

Answer :   *(Dec.-13, Q1(j) | Dec.-12/Jan.-13, Q1(i)*

For answer refer Unit-V, Page No. 5.29, Q No. 9

UNIT
1

Investments

After studying this unit, one would be able to understand,

- ❖ The Concept of Investment and Investment Decisions.
- ❖ Differentiate Real Assets from Financial Assets
- ❖ Investment Decision Process and Factors Affecting it
- ❖ The Concept and Measurement of Return-realized and Expected Return.
- ❖ The Sources and Types of Risk and Measurement of Risk
- ❖ Various Approaches to Investment Analysis.
- ❖ Behavioural Finance and Heuristic Driven Biases

INTRODUCTION

The investment environment consists of various types of marketable securities and the buying and selling decisions relating to these securities. Investment process deals with how an investor make decisions for selecting marketable securities to invest in and how and when to make investments. Before understanding the investment environment and process, the term investment must be explained.

Investment is referred as a sacrifice of present dollars for future dollars. Time and risk are the most important attributes of investment. The sacrifice which takes place in the present is certain but the amount of reward expected in future is uncertain.

Many studies which were conducted on investments have concluded that investment risk and expected return are significant for investors. The level of risk faced by investors is usually estimated by examining historical experience. There are two approaches to investment analysis, fundamental analysis and technical analysis. Fundamental analysis make use of earnings and dividend prospects of the firm, expectations of future interest rates and risk evaluation of the firm for ascertaining adequate stock prices. Technical analysis is basically done for identifying recurrent and predictable patterns in stock prices.

1.1 INVESTMENTS

Q1.   Explain briefly about investment and investment decisions.

Answer :

Investment

Investment act as a key element in business because based on capital, investor ascertains a specified quantity to produce outputs, purchases equipments, tools, buildings, etc. Even after investing, there is a probability to get losses in the form of damaged stock or out dated stock. Hence, it is essential for every investor to consider the importance of investment. Moreover, it is not possible for the investor to possess sufficient capital with him all the times. Therefore, capital can also be borrowed in the form of loan by paying interest periodically. Hence, an investor while undertaking the business yields returns in the form of profits and incurs costs in the form of paying interest rates. Interest rates plays a crucial role in business, because the borrowing rate need to be reasonable. If the interest rate is low, investor would be able to gain more profits.

Investor need to analyse the market thoroughly before investing, by considering the element of risk and finally need to invest to obtain maximum returns.

Therefore, we can define investment as, "the process of sacrificing something in present for the prospects of gaining something later". It implies that there are three dimensions to an investment, time, today's sacrifice and prospective gain.

For making proper investment involving both side and return, the investor has to make a study of the alternatives avenues of investment the risk and return characteristics and make proper projection or expectation of the risk and return of the alternative investments under consideration.

Investment Decisions

The income that a person receives may be used for purchasing goods and services that he currently requires or it may be saved for purchasing goods and services that he may require in the future. In other words, income can be used for current consumption or saved for the future consumption. Savings are generated when a person or an organization abstains from present consumption for future use. A person saving part of his income tries to find a temporary repository for his savings until they are required to finance his future expenditure. These kind of decisions are known as investment decisions.

The investment decisions are very important, firms must ensure that sufficient time is spent in planning these decisions and must ensure that all the top executives from the field of production, engineering, marketing etc., are involved in weighing up the projects carefully.

Q2.   What are the various forms of investment alternatives? Give a detailed account of any five.

Answer :   *(Model Paper-I, Q6(a) | Dec.-15, Q2(a))*

There are numbers of investment alternatives or avenues available for a investor. The most important Alternatives are shown in the following figures.
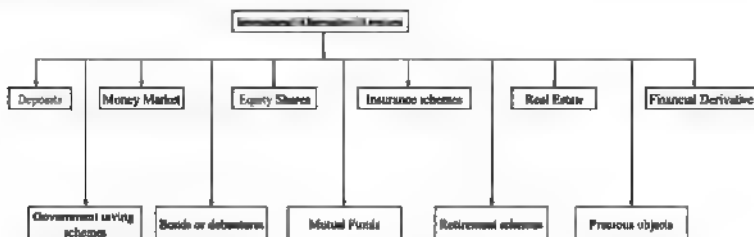

Figure: Investment Alternatives/Avenues

1.   Deposits

A sum of money paid into bank is referred as Deposit. It is a kind of financial asset of a investor. Deposits can be of different types such as Bank Deposits (current deposits, savings deposit or fixed deposit), Post Officer Deposit (P.O saving deposit, P.O time deposit, P.O monthly income scheme) and company fixed deposits.

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2.   Government Savings Schemes

In India, there are various kinds of small saving schemes available for individual investors which are offered by the government. The Indian Government offered these schemes to the investors through post office and selected banks of India. Some of the schemes are listed below,

(a)   Public Provident Fund Scheme (PPF)

(b)   Senior Citizen's savings scheme (SCSS)

(c)   National Savings Certificate (NSC).

3.   Money Market Instruments

Money market is an important constituent of Indian financial system. Reserve Bank of India defined money market as "a centre for dealings, mainly of a short-term character in monetary assets, it meets the short-term requirements of the borrowers and provides liquidity or cash to lenders. It is the place where short-term surplus investible funds at the disposal of the financial and other institutions and individuals are bid by borrowers, again comprising institutions and individuals and also by the government"

4.   Bonds or Debentures

These are long term debt instruments usually yield high rate of interest. The safety factor with these investments can be analyzed by considering credit ratings. They are freely tradeable and transferable, and hence provides for liquidity Fixed income securities provide investors with two kinds of income. They are,

(i)   Current income (periodical receipt of interest or dividend)

(ii)   Capital gains.

Debt instruments are the cherished conduit for investors money. An assured return and high interest rate are responsible for preference of bonds over equities. The year 1996-1997 witnessed their trading in the debt market, as resource mobilization reached a record level of almost ₹ 25,000 crores, which is much above the equity segment

The funds mobilized by ICICI and IDBI through debt issues accounted for high percentage of funds mopped in primary market Financial institutions, banks and corporate bonds are offering attractive bonds like deep discount bond, education bonds, flexi-bonds etc.

5.   Equity Shares

Equity shares represent ownership position in a company Equity holders are owners of the company and elect the board of directors and enjoy voting right Equity shareholders control the operations of the firm. Equity shareholders have a claim on remaining assets which are leftover after meeting the claims of creditors and preference shareholder in event of liquidation. Equity share capital is also called as risk capital, because if the company is not performing well, the holders of the equity shares are sufferers and if the company is doing well they will reap the benefits.

1.1.1   Real vs Financial Assets

Q3.   Differentiate between real and financial assets.

Answer :

Financial and real assets constitute the most important form of assets which can be differentiated on the following grounds.

	Criteria	Financial Assets	Real Assets
1	Nature	Financial assets are intangible in nature.	Real assets are tangible and are also called as physical assets.
2	Examples	Technical knowledge, trademarks, patents etc., are the examples of financial assets of a firm.	Machinery, building, inventory, computers etc., are the examples of real assets.
3	Objective	Financial assets do not contribute towards the accumulation of society's wealth.	Real assets heavily contributes towards the wealth of the society.
4	Contribution to production system	Financial assets contribute indirectly towards production of goods and the delivery of services, as they helps in providing the financial assistance to the enterprises by guiding them to specifically undertake investment opportunities	Real assets contribute directly to improve the production capacity of the firm to produce goods and services.

5	Function	Financial assets is concerned with the allocation of income or wealth among the investors, shareholders and other parties associated with the business.	Real assets is concerned with the production of goods and services.
6.	Risk	Financial assets involve less risks.	Real assets involve more risk than investing in financial assets
7	Dissolution or liquidation	Financial assets can be created and destroyed at any time during the business operations.	Real assets undergoes destruction only as a result of accidents or by wear and tear of the assets.
8.	Representation on balance sheet	Financial assets can be placed on both sides of the balance sheet such as assets and liabilities	Real assets can be shown only on the assets side of the balance sheet
9.	Components	Financial assets have both fixed and current assets.	Real assets have only fixed assets.

1.2 INVESTMENT DECISION PROCESS

Q4.   What is Investment process? Describe briefly the different steps involved in investment decisions.

Answer :   May/June-15, Q2(a)

Investment Decision Process

The investment process involves a series of activities leading to the purchase of securities or other investment alternatives.

Process/Stages of Investment Decisions

The investment process can be divided into five stages as,

1.   Investment policy

2.   Investment analysis

3.   Investment valuation

4.   Portfolio construction

5.   Portfolio evaluation


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┌─────────────────────────┐
│    INVESTMENT POLICY     │
│  • Investable funds      │
│  • Objectives            │
│  • Knowledge             │
└─────────────────────────┘
            ⇓
┌─────────────────────────┐
│   INVESTMENT ANALYSIS    │
│  • Market analysis       │
│  • Industry analysis     │
│  • Company analysis      │
└─────────────────────────┘
            ⇓
┌─────────────────────────┐
│   INVESTMENT VALUATION   │
│  • Intrinsic value       │
│  • Future value          │
└─────────────────────────┘
            ⇓
┌─────────────────────────┐
│ PORTFOLIO CONSTRUCTION   │
│  • Diversification       │
└─────────────────────────┘
            ⇓
┌─────────────────────────┐
│  PORTFOLIO EVALUATION    │
│  • Appraisal             │
│  • Revision              │
└─────────────────────────┘
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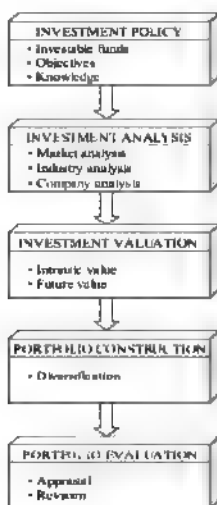
Figure: Investment Process

1. Investment Policy

The government or the investors before proceeding into investment formulates the policy for the systematic functioning. The essential ingredients of the policy are the investable funds, objectives and the knowledge about the investment alternatives and market.

(i) Investable Funds

The entire investment procedure revolves around the availability of investable funds, the fund may be generated through savings or from borrowings. If the funds are borrowed the investor has to be extra careful in the selection of investment alternatives. The return should be higher than the interest paid.

(ii) Objectives

The objectives are framed on the basis of the required rate of return, need for regularity of income, risk perception and the need for liquidity. The risk takers objective is to earn high rate of return in the form of capital appreciation, whereas the primary objective of the risk averse is the safety of the principal.

(iii) Knowledge

The knowledge about the investment alternatives and markets, plays a key role in the policy formulation. The investment alternatives range from security to real estate. The risk and return associated with investment alternatives differ from each other. Investment in equity is high yielding but has more risk than the fixed income securities. The tax sheltered schemes offer tax benefits to the investors.

The investors should aware of the stock market structure and the functions of the brokers. The mode of operation varies among BSE, NSE and other exchanges. Brokerage charges are also different. The knowledge about the stock exchange enables him to trade the stock intelligently.

2. Investment Analysis

After formatting the investment policy, the securities to be bought have to be scrutinized through the market, industry and company analysis.

(i) Market Analysis

The stock market mirrors the general economic scenario. The growth in gross domestic product and inflation are reflected in the stock prices. The recession in the economy results in a bear market. The stock prices may be fluctuating in the short run but in the long run they move in trends i.e., either upwards or downwards.

(ii) Industry Analysis

The industries that contribute to the output of the major segments of the economy vary if their growth rates and their overall contribution to economic activity changes.

Some industries grow faster than the GDP and are expected to continue in their growth. The economic significance and the growth potential of the industry have to be analyzed.

(iii) Company Analysis

The purpose of company analysis is to help the investor to make better decisions. The company's earnings, profitability, operating efficiency, capital structure and management have to be screened. These factors have direct bearing on the stock prices and the return of the investors. Appreciation of the stock value is a function of the performance of the company. Company with high product market share is able to create wealth to the investors in the form of capital appreciation.

3. Investment Valuation

The valuation helps the investors to determine the return and risk expected from an investment in the common stock.

(i) Intrinsic Value

The intrinsic value to the share is measured through the book value of the share and price earnings rates. Simple discounting model also can be adopted to value the shares. The real worth of the share is compared with the market price and then the investment decisions are made.

(ii) Future Value

Future value of the securities could be estimated by using a simple statistical technique like trend analysis. The analysis of the historic behavior of the price enables the investor to predict the future value.

4. Construction of Portfolio

A portfolio is a combination of securities. The portfolio is constructed in such a manner to meet the investor goals and objectives. The investor should decide how best to reach the goals from the securities available. The investor tries to attain maximum return with minimum risk. Towards the end he diversifies his portfolio and allocates funds among the securities.

❖ Diversification

The main objective of diversification is the reduction of risk in the loss of capital and income. A diversified portfolio is comparatively less risky than holding a single security. There are several ways to diversify the portfolio.

(a) Debt and Equity Diversification

Debt instruments provide assured return with limited capitals appreciation. Common stocks provide income and capital gain but with the flavor of uncertainty. Both debt instruments and equity are combined to complement each other

(b) Industry Diversification

Industries growth and their reaction to government policies differ from each other. Banking industry shares may provide regular but with limited capital appreciation. The information technology stock yield high return and capital appreciation, but their growth potential after the year 2002 is not predictable. Thus, industry diversification is needed as it reduces risk.

(c) Company Diversification

Securities from different companies are purchased to reduce risk. Technical analysis suggests the investors to buy securities based on the price movement. Fundamental analysts suggests the selection of financially sound and investors friendly companies.

5. Portfolio Evaluation

Based on the diversification level, industry and company analyses the securities have to be selected. Funds are allocated for the selected securities. Selection of securities and the allocation of funds and seals the construction of portfolio. The portfolio has to be managed efficiently the efficient management calls for evaluation of the portfolio. This process consists of portfolio appraisal and revision.

(i) Appraisal

The return and risk performance of the security may vary from time to time. The variability in returns of the securities is measured and compared.

The development in the economy, industry and relevant companies from which the stocks are bought have to be appraised, the approval warns the loss and steps can be taken to avoid such losses.

(ii) Revision

Revision depends on the results of the approval. The low yielding securities with high risk are replaced with high yielding securities with low risk factor. To keep the return at a particular level necessitates the investment to revise the components of the portfolio periodically.

1.2.1 Sources of Investment Information

Q5. What is Investment Information? Explain the various sources of Investment Information in the light of the IT era.

Answer :

Investment Information

Investment such as government securities, bank and post office deposits and other investments are risky. An investment decision, therefore, calls for careful evaluation of available alternatives, assessing the reward and risk associated with each of the alternatives that are believed to best serve the investment objectives at hand.

Despite the facts that luck and experience play their role in making the correct choice, the objective and intelligent investment decisions are always based on sound information.

The investment results are influenced by the whole gamut of events, public policy changes, market conditions, policies and performance of companies and so on. So data have to be gathered on economic and market events, national and international events, public and corporate policies and performance facts.

Since, the gathering of primary data is both time consuming and costly, the investing public has to resort to the sources of secondary information.

Further, to facilitate quick analysis and decision making, it would be useful to collect data from sources that have already done a good deal of data analysis and condensed them into a capsule form. Various agencies publish various types of data. There are a number of trade journals, periodicals, official documents, advisory reports published by the investment brokers and counsellors that can be valuable sources of information for investment decision making.

Sources of Investment Information

Some of the important sources of investment information are briefly described below,

A. Economic and Industry Data

1. Monthly abstract of statistics and monthly statistics of the production of selected industries in India are the two important publications of the Central Statistical Organization.

   The former contains information on selected economic indicators such as national income, agricultural production, industrial production, money supply imports, exports etc. The later provides industry-wise production data, plan outlays, industry-wise production they provide useful for gauging the economy's well-being, trends in and direction of the economy and business trends and cycles.

2. The economics survey, the explanatory memorandum on the budget of the central government and the finance budget of the government of India need a careful study by the investors.

They provide data analysis of current economic scene, the effects of fiscal and monetary policies of the past, government revenues, expenditures and deficit financing, proposed fiscal and monetary measures to be adopted in the forthcoming year

3. The weekly statistical supplement, monthly bulletin, report on currency and finance and the annual report of the Reserve Bank of India (RBI) are an invaluable source of macro data.

In these publications, the RBI provides considerable data in a concise form among others, money supply, prices, exchange rates, balance of payment situation, bank credit liquidity position of the banking system and the strategy and monetary tools employed by the RBI Thus, these sources shed considerable light on the financing and investment climate prevailing in the country

4. The Centre for Monitoring Indian Economy (CMIE) and the Commerce Research Bureau (CRB) are two non-government agencies that collect, classify and present main economic data in a capsule form.

5. The Economic Monitoring Services of the Commerce Research Bureau brings out a weekly report on prices, money and banking and world currency developments.

B. Market Data

A number of sources provide stock market data ranging from price quotations to reviews of stock market trends in India. Important sources of market information include,

1. Stock Exchanges Daily Official List

It provides daily price quotations and various characteristics (i.e., redemption, tax status, dividend announcement, gross dividend per share, date of closure of register of members etc.,) of the quoted securities central and state government securities, corporate bonds, preference shares and equity shares.

2. Official Year Book/Directory of the Stock Exchange

These publications review stock market trends, new issues made during the year, official policy in regard to capital issues, brokerage, stamp duty etc., besides providing a wealth of information on the working of companies.

3. RBI's Weekly Statistical Supplement, Monthly Bulletin and Report and Currency and Finance

As noted before, these publications are a valuable source of economic and industry data. Besides, they give All-India, regional and industry-wise index numbers of security prices, running and redemption yield in various types of securities

4. The Economic Times, Financial Express, Business Standard, Fortune India, Investments Today, Economic Scene, Commerce and Business India

These are some of the new transfer and periodicals that carry (on a regular basis) a wealth of stock market information, market quotations, review stock market trends. Articles on current developments affecting stock market's future movements and other matters of interest to the investor

5. The Reports and Newsletters of Investment Brokerage and Counselling Firms

These are other important sources of market data. They provide, among others, stock market reviews, trends and a detailed analysis of securities in which they are specialized.

C. Company Data

The fundamental analysis and valuation of stocks call for gathering and examination of the company's specific data. So, is of interest to the investors

1. Company's annual reports and prospectus are the main sources of company data, the former being an annual feature of a public company and the later being published while making public issue The annual report contains the chairman's speech, balance sheet and profit and loss account with explanatory notes and a review of the working of the company over the last 5 to 10 years.

It outlines what the company proposes to do in the next year. In the prospectus, company presents a review of their working, the composition of their management team and their future investment plans for which the capital is sought from the public

2. Stock exchange official directory is another important source It covers all the companies whose shares are listed on the stock exchange and gives for each company, its brief history, progress and balance sheet and profit and loss accounts and important financial ratios, their trend over the last ten years

3.   Kothari's economic and investment guide of India, a yearly publications of the Kothari and sons, is yet another important source of company data. This guide contains a lot of data on individual companies, their progress and management besides a good write-up on industry scene.

4.   The economic times, financial express, business standard, commerce and business India and India today present reports, comments, reviews of the working of individual companies, changes in company policy and management, future plans prospects of the companies.

5   Some government sources provide company or company related information. The company news and notes, a monthly publication of the department of company affairs, government of India, carries circulars and notification is in respect of changes and/or interpretation of the provisions of the companies act.

D.   International Data

In today's interdependent world, the international economic, political, market, business and technological developments have a considerable bearing on the conditions and prospects prevailing in a country's economy, market and for business firms.

To evaluate the investment worth of securities of companies engaged in joint ventures with foreign collaborators, export oriented companies and multinational companies, it is important to collect and examine the international economic, market and business data. Furthermore, information relating to the international money, capital and currency exchange market data is important for international portfolio investment.

Some important sources of international data include the following,

1.   **International Financial Statistics,** a monthly publication of the International Monetary Fund (IMF) Provides for each country yearly, quarterly and monthly data on major economic indicators such as GNP, money supply consumer price index, stock market indices, currency exchange rate expressed in the US dollars and balance of payment condition.

2.   **Moody's and Standard, Poor's Industrial Banking and Finance and other International Manuals** cover extensively the individual company profiles of both the US and international companies.

3.   **Capital International Perspective,** a Geneva publication, reports on the various national stock market, indicates a world capital market, international interest rates and capital flows.

4.   **The Financial Times of London,** the Economist, the UK weekly, the Wall Street Journal, a U.S daily, Baron's National Business and Financial Weekly of the USA. International Business Week. Fortune International and the Far Eastern Economic Review are some of the international newspapers and periodicals that contain a lot of information on current international developments of interest to business executive and the investors.

E.   New Sources

The financial packages provide the information about the various facts of the economy, industry and companies in the user friendly manner Some of the financial packages are introduced here in brief They include,

(I)   CIMM

CIMM is a database, introduced by the well-known research organization called Center for Monitoring the Indian Economy (CMIE). It provides company specific information both qualitative and quantitative under different heads.

It also provides industry specific data in a very lucid fashion. Stock market information is also given by this package and updated on a monthly basis.

(II)   Cline-Ole

This package is designed and marketed by capital market, a well-known organization in the field of finance This package also provides the information on companies, industry and economy Information is also provided by this package

(III)   Vans

This is a unique product introduced by the Vans Information Services Ltd., a Mumbai based company. This is basically a package, which provides the information of various articles and news in the different magazines and newspapers. Finally, world wide web sites are the most powerful source to generate investment information in the present day world. Various search engines available on internet helps investor to source specific investment related information.

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1.2.2 Scope, Features and Importance of Investment Programmes

Q6. Explain the scope, importance and features of investment programmes.

Answer :

Scope and Importance of Investment

The following information depicts the scope and importance of investment.

(i) It enables employees to select a suitable retirement funds which yields them maximum returns from their savings.

(ii) Individuals have started to enter into financial markets and able to own stocks to a greater extent. Among all markets, mutual funds was able to attract many small investors in achieving adequate returns.

(iii) Apart from undertaking business, it has become a source of profession by becoming investment bankers who provide securities to sell and supporting in the dealings of mergers and acquisitions.

(iv) Therefore, individuals possessing the adequate knowledge of how to trade securities, have the scope of turning into portfolio managers, security analyst.

Eventually, investments is helpful to corporates, individuals, investors and society resulting in fulfilment of multiple tasks.

Features of an Investment Programme

Features of an investment programme act as a key component to the investors in choosing investment policies.

1. Capital Growth

It plays a pivotal role in valuing a company. Hence, investors continuously work towards the achievement of "growth stocks". Wherein the relationship between corporation and industry growth and capital appreciation can be obtained. A perfect model of "growth stock" is obtained when a right industry is chosen for a right issue and at the right time, which is a complicated work.

2. Safety of Principal

Even though, it is not possible to protect the investment completely, their is a scope to safeguard against certain expected reasonable losses. Diversifying the investment is a worth while option so as to control certain losses. Diversification can be done through horizontal as well as vertical. When an investor deals with same stage of production in various companies, then it is an horizontal diversification. In contrast, in a vertical diversification, investors own various stages of production, i.e., from raw

material to finished goods in various companies. Another form of diversification is first categorising the securities as bonds and shares. Again regrouping those bonds and shares into various types. But over diversification involves many complications and hence not advisable.

3. Purchasing Power Stability

Every investor need to focus on future purchasing power because almost all investors invest their current funds with a faithfulness of acquiring higher profits in future. Investors need to analyze carefully, the following factors, in order to sustain purchasing power stability

(i) Likelihood of profits and losses which can be achievable from investment.

(ii) Expecting the standard of inflation.

(iii) Restrictions levied with regard to family and personal matters.

4. Adequate Liquidity and Collateral Value

In any business, unexpectedly, cash could be required at any time, without which profitable opportunities can be lost. Therefore, every investor need to allot certain degree of those assets which can be easily transferred into cash as and when required in order to have stable market value. Investment could be liquid, if it is either marketable or reversible. When the investment is sold for cash in market then it is marketable whereas in reversibility, business deal is either winded-up or reversed.

5. Tax Benefits

An organization's true value is ascertained, only by considering earnings after tax. Earnings before tax can be regarded as only notional profits as they highly get affected by taxes. Here, an investor is concerned mainly with two issues, his income and payment of tax. Because tax is based on income. If the investor's income is high, then tax levied would also be high and if the income is low then payment of tax is also less.

6. Income Stability

It is essential to possess the strong durability of purchasing power income and monetary income. Although, sometimes, if the situation changes, focus must be shifted on other features that helps in rendering it to a balanced form.

7. Concealability

Investors need to disguise the property to protect from uncertain degrees of taxation, social disorders or government confiscation. Gold and precious items are regarded as best examples as its worth is high with low volume and easily convertible.

1.2.3 Investment Vs Speculation Vs Gambling

Q7. Differentiate between investment and speculation. How investment differs from gambling?

Answer :

Investment Vs Speculation

		Investment	Speculation
1.	Time horizon	Plans for a longer time horizon. His holding periods may be from year to few years.	Plans for a very short period. Holding period varies from few days to months.
2.	Risk returns	Assumes moderate risk. Like to have moderate rate of return associated with limited risk	Willing to undertake high risk. Like to have returns for assuming high risk
3.	Decision	Considers fundamental factors and evaluates the performance of the company regularly.	Considers inside information, here says and market behaviour
4.	Funds	Uses his own funds and avoids borrowed funds.	Uses borrowed funds to supplement his personal resources.

Investment Vs Gambling

Investment has to be distinguished from gambling. Typical examples of gambling are horse races, card games, lotteries etc. Gambling involves taking high risks not only for high return but also for thrill and excitement.

Gambling is unplanned and non scientific, without knowledge of the nature of the risk involved

It is surrounded by uncertainty and is based on tips and rumours. In gambling, artificial and unnecessary risks are created for increasing the returns.

Investment is an attempt of careful planning, evaluation and allocation of funds to various investment outlets which offer safety of principal with moderate and continuous return over a long period of time

1.3 FACTORS TO BE CONSIDERED IN INVESTMENT DECISION

Q8. What is Investment? Explain the different factors to be considered in investment decision.

Dec.-14, Q2(a)

OR

Explain the factors that are being considered while taking investment decisions.

OR

Explain the influencing factors for investment decision.

Dec.-13, Q2(a)

(Refer Only Topic: Factors to be Considered While Making an Investment)

OR

Discuss the factors to be considered in investment decision.

(Refer Only Topic: Factors to be Considered While Making an Investment)

Answer :   *May/June-13, Q2(a)*

Investment Decision

For answer refer Unit-I, Page No. 1.2, Q No. 1, Topic Investment Decisions.

Factors to be Considered While Making an Investment

The factors to be considered while making an investment include,

1.   Amount of investment
2.   Minimum rate of return on investment
3.   Return expected from the investment
4.   Ranking of investment proposals
5.   Risk and uncertainty

1. Amount of Investment

When a firm has unlimited funds for investment, it can accept all the capital investment proposals which give a rate of return higher than the minimum acceptable or cut-off rate.

However, most firms have limited funds and therefore capital rationing has to be imposed. In such a situation the firm can accept only those proposals which are within its means.

For this purpose, all the projects are arranged in an ascending order according to the capital investment required and accept only those projects which are within its capital constraints.

2. Minimum Rate of Return on Investment

The management expects a minimum rate of return on the capital investment. The minimum rate of return is usually decided on the basis of the cost of capital. The minimum rate of return is also called as cut-off-point. The cut-off-point refers to the point below which a project would not be accepted.

3. Return Expected from the Investment

Investment decisions are made in anticipation of increased return in the future. Therefore, it is necessary to estimate the future return or benefits accruing from the investment proposals.

4. Ranking of Investment Proposals

When a number of projects appear to be accepted on the basis of their profitability the projects will be ranked, in order of their profitability is order to determine the most profitable project.

5. Risk and Uncertainity

Different investment proposals have different degrees of risk and uncertainity. Risk involves situations in which the probabilities of a particular event occuring are known whereas in uncertainity these probabilities are unknown.

1.3.1 Characteristics of Investment Decisions

Q9. Explain about various characteristics of investment decisions.

Answer :

For answer refer Unit-1, Page Nos. 1.11 and 1.12, Q.Nos. 10 and 11.

1.3.2 Liquidity, Return, Risk, Maturity, Safety, Tax and Inflation

Q10. Explain the concept of liquidity, return and risk related to investment decisions.

Answer :

Investment decisions are characterized by the following features such as liquidity, return and risk, so that firm can earn significant profits by making investments.

1. Liquidity

Liquidity means the potentiality of an investor to sell-off its assets without much delay and without making any significant discount. Liquidity is also called as marketability.

Example of liquid assets are money market instruments whereas collectable like a piece of artwork is an illiquid asset. It is difficult for an investor to sell a painting or any piece of artwork within an hour and if it happens also the painting should be sold for a low price.

2. Return

Return is one of the most important motivating factor which encourages investment. Return is the premium given to the investor for making investment. In order to evaluate the performance of investment manager, it is very essential to calculate the historical returns. These returns are also commonly used as a key input for forecasting the returns in future.

The return of an investment includes two elements which are as follows.

(i)   Current Return

The first element of return is periodic cash flow (income) like dividend or interest which are produced from the investment. Current return is assessed as the regular periodic income in connection with the initial price of the investment.

(ii)   Capital Return

Capital return is the second element of return which is exhibited in the price fluctuations. Capital return is referred as appreciation or depreciation in price which is divided by the initial price of the asset. Capital return dominates the assets such as equity stocks, etc.

Hence, the total return for any security is given as,

Total return = Current return + Capital return

The value of current return can be zero or positive whereas the value of capital return can be negative, zero or positive.

3.   Risk

Risk means the uncertainty or probability that the actual outcome of an investment may be different from the desired outcome. In other words, risk refers to the variability in returns from a security. Basically, the investors concentrate more on actual outcome which is less than the expected outcome. If the range of potential outcome is wide then the risk will also be high.

Risk emerges from many sources and among them, the three important sources are business risk, interest rate risk and market risk. The modern portfolio theory expressed total risk as,

Total risk = Unique risk + Market risk

Unique risk is a part of total risk which arises from some specific factors of the firm, such as labour strike, development of new product or entry of new competitor. It is also called as diversifiable risk or unsystematic risk. Market risk is a part of total risk which is related with economy-wide factors such as growth rated of GDP, money supply, inflation rate and interest rate structure. It is also called as systematic risk or non-diversifiable risk.

Q11.   Explain the concept of maturity, safety, tax and inflation by highlighting its special features related to investment decisions.

Answer :

Investment decisions are characterised by the following features like maturity, safety, tax and inflation. All these factors have a significant impact on the investment decision.

1.   Maturity

Maturity is the essence of security. It means the last payment date of a loan or any other financial instrument, for which the interest and the principal is left as due to be paid. Maturity is a time span in which the borrower should fulfil, the obligation of repaying the amount, as it will be the end of the life of a security. Every debt has a maturity date, which is a date by which the debt must be paid off. Maturity date is fixed at the time of issuance of debt and it can be from one day to 20 or 30 years or more. A short-term debt is a debt which matures within a year of its issuance whereas, a long-term debt is a debt which matures after a year or more from its issuance.

2.   Safety

The investments does not provide complete safety, it only protects from loss under certain reasonable conditions. Before taking a decision about the type or timing of investments, a careful analysis of economic and industry trends should be done. The safety of an investment refers to the certainty of returns of capital without loss of money or time. Safety is an important feature which an investor desires for his investments. Every investor expects to get back his capital on maturity without loss and without any delay. If the return is higher, then the degree of safety is less.

3.   Tax

Taxation must not be considered as an absolute evil as it provides some benefits to few individuals which are greater than the related costs which other individuals have to bear. Irrespective of taxation benefits, taxes have a considerable influence on investment decisions and, its results. As the investors are more interested in after-tax returns, the securities in the market are priced based on the federal and state tax laws.

Before making any investment decision, the investor must initially ascertain the applicable tax rate. After identifying the applicable tax rate, the security's expected after-tax return and risk must be forecasted by investor so that he can make an intelligent investment decision. Both personal and corporate income taxes play an important role in investment decision making.

4.   Inflation

Like taxation, inflation also provide benefits to some individuals which are greater than the related costs borne by other individuals. Inflation also have a significant impact on investment decisions and results. The inflation rate helps the investor in taking intelligent investment decision. As inflation is directly linked with the economy, it helps in determining the economic conditions of a country and provides information to investor to take an effective decision.

1.4 THE CONCEPT AND MEASUREMENT OF RETURN – REALIZED AND EXPECTED RETURN

Q12. Explain risk and return with reference to investment. Write briefly about realized and expected returns.

Answer :

The risk and return with reference to investment is shown in the following figure,
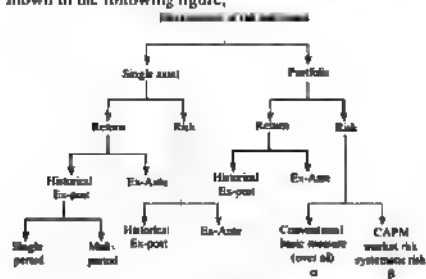
Figure

Risk

For answer refer Unit-I, Page No. 1.12, Q.No. 10, Topic. Risk.

Return

The term "return" from an investment refers to the benefits from that investment. In the field of finance in general and security analysis in particular, the term return is almost invariably associated with a percentage (say, return on investment of 12%) and not a more amount (like, profit of ₹ 150).

In security analysis we are primarily concerned with return from investor's perspective. Our main concern is to compute the return for an investor from a particular investment say, a share or a debenture or some other financial instrument.

Realized Return

The return earned or received by investor on investment for some previous period of time is known as realized return. Usually, investors invest their money for future returns which they expect to earn, but when investing period is expired or finished, then the investors will have their realized returns.

Expected Return

The return which is expected by the investors to realize after making investment is known as expected return. However, the expectation of the investors depends on the return of risk free investment such as treasury note, risk premium etc. Thus, the higher the risk, higher will be the expected return.

1.4.1 Ex-ante and Ex-post Returns

Q13. Explain the concept of ex-post and ex-ante returns.

Answer :

Ex-post Returns

Ex-post returns refer to the actual returns obtained from the investments. They properly measure the returns generated by an investment, one must consider both the price change and cash flow derived from the investment during the period it was held.

The measurement of returns from the historical data can be referred to ex-post returns. This includes both current income and capital gains (or losses) brought about by the appreciation (or depreciation) of the price of the security. The income and capital gains price of the security. The income and capital gains are then expressed as a percentage of the initial investment.

Ex-ante Returns

The majority of investors tends to emphasize the returns they expect from a security while making investment decision and the expected return of a security. This enables investor to look into future prospects from an investment and the measurement of return from expectations of benefits is known as ex-ante returns.

The equations for quantifying the return, variance and standard deviation of individual security returns for both ex-post and ex-ante data are summarized in the following table,

Historical (Ex-post)	Expected (Ex-ante)
Arithmetic mean return	Expected return
$r = \frac{1}{n} \sum_{i=1}^{n} r_i$	$E(r_i) = \sum_{S=1}^{n} r_a P_s$
Variance (Risk)	Variance (Risk)
$\sigma_i^2 = \frac{1}{n-1} \sum_{i=1}^{n} (r_a - \bar{r}_p)^2$	$\sigma_i^2 = \sum_{S=1}^{n} [r_a - \bar{r}_i]^2 \, P_s$
Standard deviation	Standard deviation
$\sigma_i = \sqrt{\frac{1}{n} \sum_{i=1}^{n} (r_a - r_i)^2}$	$\sigma_i = \sqrt{\sum_{S=1}^{n} [r_a - r_i]^2 P_s}$

PROBLEMS

1.   Compute returns (ex-post) from the following data.

	A Ltd.	B Ltd.
Price as on 31-3-2000 (₹)	20.00	10.00
Price as on 31-3-2001 (₹)	15.00	15.00
Dividends for the year 2000-2001 (₹)	1.00	1.00

Solution :

Returns ex-post from holding the stock of A Ltd., is calculated as follows,

A Ltd.,

$$r_{2001} = \frac{(P_{2001} - P_{2000}) + D_{2001}}{P_{2000}}$$

$$= \frac{(15 - 20) + 1}{20}$$

$$= \frac{-5 + 1}{20} = \frac{-4}{20}$$

$$= -0.2 \text{ or } 20\%$$

Similarly, for B Ltd ,

$$r_{2001} = \frac{(15 - 10) + 1}{10} = \frac{5 + 1}{10} = \frac{6}{10}$$

$$= 0.6 \text{ or } 60\%$$

2.   Assessment of return on a share of planet corporation under three different scenarios is as follows,

Scenario	Chance	Return (%)
1	0.25	36
2	0.50	26
3	0.25	12

What is the expected return on the share of planet corporation?

Solution :

The expected return on the share of planet corporation will be as follows,

$$E(r) = (0.25 \times 36) + (0.50 \times 26) + (0.25 \times .2) = 9 + 13 + 3 = 25\%$$

3.   From the following data of PQR Ltd, determine return and risk.

R₁ (%)	18	21	16	12	14

Solution :

$$\text{Return, } r = \frac{\sum r}{n}$$

$$= \frac{18 + 21 + 16 + 12 + 14}{5} = \frac{81}{5} = 16.2\%$$

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$$\text{Risk, } \sigma = \sqrt{\dfrac{\dfrac{(18-16.2)^2+(21-16.2)^2+(16-16.2)^2}{+(12-16.2)^2+(14-16.2)^2}}{5}}$$

$$= \sqrt{\dfrac{3.24+23.04+0.04+17.64+4.84}{5}} = \sqrt{\dfrac{48.8}{5}} = \sqrt{9.76} = 3.12\%$$

4. From the following information, calculate returns and risk.

R, (%)	12	10	8	6	12
Probability	0.2	0.1	0.3	0.2	0.2

Solution :

Determination of Return and Risk

r_j (%)	P_j	$\bar{r} = r_j \times P_j$	$(r_j - \bar{r})^2$	$P_j(r_j - \bar{r})^2$
12	0.2	2.4	6.76	1.352
10	0.1	1.0	0.36	0.036
8	0.3	2.4	1.96	0.588
6	0.2	1.2	11.56	2.312
12	0.2	2.4	6.76	1.352
		9.4		5.64

Return, $r = 9.4\%$

Risk, $\sigma = \sqrt{5.64} = 2.37$

1.4.2 Measurement of Portfolio Returns

Q14. Discuss the measures of risk and return of a portfolio of two securities.

Answer :

Portfolio

Investing in securities such as shares, debentures and bonds is profitable as well as exciting. It is indeed rewarding, but involves a great deal of risk and calls for scientific knowledge as well as artistic skills.

In such investments, both rational as well as emotional responses are involved. Investing in financial securities is now considered to be one of the best avenues for investing one's savings while it is acknowledged to be one of the most risky avenues of investment. It is rare to find investors investing their entire savings in a single security. Instead, they tend to invest in a group of securities. Such a group of securities is called portfolio. Creation of a portfolio helps to reduce risk without sacrificing returns.

An investor invests his funds in a portfolio expecting to get a good return consistent with the risk bearing capacity. Hence, portfolio formation is the most important part of investment decision making.

Portfolio Return

The return on a portfolio is simply the weighted average return, a portfolio return can be calculated with the following equation as,

$$r_p = \sum_{j=1}^{N} W_j r_j$$

Where,

W_i = Weight of asset i and

r_i = Return for asset i.

Portfolio Risk

Risk is defined as variability of return from a portfolio. The variability of return is measured with variance and standard deviation.

The variance of returns for a portfolio of assets can be calculated with the following general formula as,

$$\sigma_p^2 = \sum \sigma_{(i,j)}^2 W_i^2 + 2 \sum cov_{(i,j)} W_i W_j$$

Where, W_i and W_j are the weights for assets i and j, σ_{ij} is the variance for the ith asset, σ_{ij} is the covariance of assets i and j and N denote number of assets (i, j).

The square root of the variance is the portfolio's standard deviation of returns (σ_p).

The portfolio standard deviation of X and Y as,

$$\sigma_{xy} = \sqrt{\sigma_X^2 W_X^2 + \sigma_Y^2 W_Y^2 + 2\rho_{XY} \, \sigma_X \sigma_Y W_X W_Y}$$

Two-asset Case

The objective of forming portfolio is to maximize return and minimise risk. The parameter of co-variables correlation defines the movement of return on assets comprising the portfolio along with direction of such a movement inversely co-related returns tends to reduce risk.

The correlation between two assets are, three +1 or 0 or 1

If it is perfectly positive correlation i.e.,

$\rho = +1$ we can change the above formula.

When, $\rho_{ij} = +1$

$$\sigma_p = \sqrt{\sigma_i^2 W_i^2 + \sigma_j^2 W_j^2 + 2\rho_{ij} \sigma_i \sigma_j W_i W_j}$$

Let, $\sigma_i W_i = a$

$$\sigma_j W_j = b = \sqrt{a^2 + b^2 + 2ab}$$

$$\sigma_p = \sqrt{(a+b)^2} = a + b$$

$$\sigma_p = \sigma_i W_i + \sigma_j W_j$$

When, $\rho_{ij} = 1$

Let, $\sigma_i W_i = a$

$\sigma_j W_j = b$

$$\sigma_p = \sqrt{(a-b)^2} = a \quad b$$

$$\sigma_p = \sigma_i W_i \quad \sigma_j W_j$$

When, $\rho_{ij} = 0$

$$\sigma_p = \sqrt{\sigma_i^2 W_i^2 + \sigma_j^2 W_j^2}$$

The risk and return of a portfolio consisting of two assets A and B with equal weights can be computed as follows,

Calculation of Portfolio Risk for Two Assets

$\sigma_A = 1.5$

$\sigma_B = 2.42$

$\rho_{AB} = +1, 0, -1$

Risk of portfolio when, $\rho_{AB} = +1$

$$\sigma_p = \sigma_A W_A + \sigma_B W_B$$
$$= [1.5 \times 0.5] + [2.42 \times 0.5]$$
$$= 0.75 + 1.21 = 1.96$$

Risk of portfolio when, $\rho_{AB} = 1$

$$\sigma_p = \sigma_A W_A \quad \sigma_B W_B$$
$$= [1.5 \times 0.5] \quad [2.42 \times 0.5]$$
$$= 0.75 \quad 1.21 = -0.46$$

Risk of portfolio when, $\rho_{AB} = 0$

$$\sigma_p = \sqrt{\sigma_A^2 W_A^2 + \sigma_B^2 W_B^2}$$
$$= \sqrt{1.5^2 \times 0.5^2 + 2.42^2 \times 0.5^2}$$
$$= \sqrt{2.25 \times 0.25 + 5.86 \times 0.25}$$
$$= \sqrt{0.5625 + 1.465} = 1.42$$

Risk with negative correlative is low.

n-Asset Case

A portfolio formed with three or more securities can be evaluated in terms of return and risk in the following manner.

Portfolio Return

$$r_p = r_1 W_1 + r_2 W_2 + r_3 W_3 + \ldots + r_n W_n$$

Where, $r_1, r_2, \ldots r_n$ are returns on securities $1, 2, \ldots, ns$ and

$W_1, W_2, \ldots, W_n$ are weights of securities in the portfolio.

Portfolio Risk

$$\sigma_p = \left[\sigma_1^2 W_1^2 + \sigma_2^2 W_2^2 + \ldots + w_n^2 W_n^2 + 2\rho_{12} W W_2 \sigma_1 \sigma_2 + 2\rho_{13} W_1 W_3 \sigma_1 \sigma_3 + \ldots + 2\rho_{(n-1)n} W_{n-1} W_n \sigma_{n-1} \sigma_n\right]^{1/2}$$

Measurement of Portfolio Risk

For answer refer Unit-1, Page No. 1.24, Q.No. 19

<div align="center">**PROBLEMS**</div>

1. Calculate portfolio return and risk from the following information. The portfolio consist of equal weights of securities X and Y.

r_x (%)	12	14	12	16	13
r_y (%)	20	22	25	18	23

Solution :

Determination of Portfolio Risk and Return

r_x (%)	r_y (%)	$(r_x - \bar{r}_x)$	$(r_y - \bar{r}_y)$	$(r_x - \bar{r}_x)^2$	$(r_y - \bar{r}_y)^2$	$(r_x - \bar{r}_x)(r_y - \bar{r}_y)$
12	20	1.4	-1.6	1.96	2.56	2.24
14	22	0.6	0.4	0.36	0.16	0.24
12	25	1.4	3.4	1.96	11.56	4.76
16	18	2.6	3.6	6.76	12.96	9.36
13	23	0.4	1.4	0.16	1.96	0.56
67	108	0	0	11.2	29.2	-12.2

Return on X,

$$\bar{r}_x = \frac{\sum r_x}{n} = \frac{67}{5} = 13.4\%$$

Return on Y,

$$r_y = \frac{\sum r_y}{n} = \frac{108}{5} = 21.6\%$$

Risk, $\sigma_x = \sqrt{\dfrac{\sum(r_x - \bar{r}_x)^2}{n}}$

$$= \sqrt{\frac{11.20}{5}}$$

$$= \sqrt{2.24} = 1.50$$

$$\sigma_y = \sqrt{\dfrac{\sum(r_y - \bar{r}_y)^2}{n}}$$

$$= \sqrt{\frac{29.2}{5}}$$

$$= \sqrt{5.84} = 2.42$$

Covariance of X and Y

$$Cov_{xy} = \frac{\sum[(r_x - \bar{r}_x)(r_y - \bar{r}_y)]}{5}$$

$$= \frac{-12.2}{5}$$

$$= -2.44$$

Coefficient of Correlation

$$\rho_{xy} = \frac{Cov_{xy}}{\sigma_x \sigma_y} = \frac{-2.44}{1.50 \times 2.42}$$

$$= \frac{2.44}{3.63} = 0.67$$

Portfolio is equally weighted and hence,

$W_x = 50\%$ or 0.5 and

$W_y = 50\%$ or 0.5

Portfolio Return (r_p)

$$r_p = (r_x W_x) + (r_y W_y)$$

$$= (13.4 \times 0.5) + (21.6 \times 0.5)$$

$$= 6.7 + 10.8 = 17.5\%$$

Portfolio Risk (σ_p)

$$\sigma_p = \sqrt{\sigma_x^2 W_x^2 + \sigma_y^2 W_y^2 + 2\rho_{xy}\sigma_x\sigma_y W_x W_y}$$

$$= \{[(1.5)^2(0.5)^2] + [(2.42)^2(0.5)^2] + [2(-0.67)(1.5)(2.42)(0.5)^2]\}^{1/2}$$

$$= \sqrt{0.5625 + 1.4641 - 1.2161}$$

$$= \sqrt{0.8105}$$

$$= 0.90\%$$

2. A portfolio consist of 40% of security X and 60% of security Y. It has the following probability distribution of returns. Calculate portfolio return and risk.

State	Probability	Ret. X(%)	Ret. Y(%)
Boom	0.1	14	20
Recession	0.2	-5	-2
Normal	0.4	10	9
Recovery	0.1	9	14
Slow growth	0.2	12	18

Solution :

Determination of Portfolio Return

P$_x$	r$_x$	r$_x$P$_x$	r$_y$	r$_y$P$_x$
0.1	14	1.4	20	2.0
0.2	-5	-1.0	-2	-0.4
0.4	10	4.0	9	3.6
0.1	9	0.9	14	1.4
0.2	12	2.4	18	3.6
		7.7		10.2

Return on $X(r_x) = \sum |r_x P_x| = 7.7\%$

Weights, $W_x = 40\% = 0.40$

$W_y = 60\% = 0.60$

Portfolio Return (r$_p$)

$r_{rp} = (7.7 \times 0.4) + (10.2 \times 0.6)$

$= 3.08 + 6.12 = 9.2\%$

Determination of Portfolio Risk

P$_x$	r$_x$	r$_y$	$(r_x - \bar{r}_x)$	$P_x(r_x - \bar{r}_x)^2$	$(r_y - \bar{r}_y)$	$P_x(r_y - \bar{r}_y)^2$	$P_x(r_x - \bar{r}_x)(r_y - \bar{r}_y)$
0.1	14	20	6	3.6	8.2	6.724	4.92
0.2	-5	-2	13	33.8	13.8	38.088	35.88
0.4	10	9	2	1.6	-2.8	3.136	-2.24
0.1	9	14	1	0.1	2.2	0.484	0.22
0.2	12	18	4	3.2	6.2	7.688	4.96
	40	59		42.3		56.12	43.74

Risk on X (σ$_y$)

$\sigma_y = \sqrt{\sum [P_x(r_y - \bar{r}_y)^2]}$

$= \sqrt{56.12}$

$= 7.49\%$

Risk on X (σ$_x$)

$\sigma_x = \sqrt{\sum [P_x(r_x - r_x)^2]}$

$= \sqrt{42.3}$

$= 6.5\%$

Covariance of X and Y

$Cov_{xy} = \sum P_x(r_x - \bar{r}_x)(r_y - \bar{r}_y)$

$= 43.74$

Coefficient of Correlation

$$\rho_{xy} = \frac{\text{Cov}_{xy}}{\sigma_x \sigma_x}$$

$$= \frac{43.74}{6.5 \times 7.49}$$

$$= 0.8987\%$$

Portfolio Risk (σ_p)

$$\sigma_{xy} = \sqrt{(42.3 \times 0.16) + (56.10 \times 0.36) + (2 \times 0.8987 \times 6.5 \times 7.49 \times 0.4 \times 0.6)}$$

$$= \sqrt{6.768 + 20.196 + 21.00}$$

$$= \sqrt{47.964}$$

$$= 6.926\%$$

---

3. J.E Ltd has a portfolio of five stocks with the following expected market values and returns.

Stocks	Market value (₹)	Return (%)
Ace	40,000	8
Bell	50,000	20
Crown	20,000	15
Dell	1,00,000	9
Egan	30,000	12
	2,40,000	

Determine J.E Ltd's expected portfolio return.

Solution :

Determination of Portfolio Return

Stock	Market value (₹)	Weights (W)	r_i (%)	$W_i \times r_i$
Ace	40,000	$\frac{40,000}{2,40,000} = 0.167$	8	1.34
Bell	50,000	$\frac{50,000}{2,40,000} = 0.208$	20	4.16
Crown	20,000	$\frac{20,000}{2,40,000} = 0.083$	15	1.25
Dell	1,00,000	$\frac{1,00,000}{2,40,000} = 0.417$	9	3.75
Egan	30,000	$\frac{30,000}{2,40,000} = 0.125$	12	1.50
	2,40,000			12.00

Portfolio Return

$$r_p = \sum_{i=1}^{N=5} W_i r_i = 12.00\%$$

4. From the following data provided by Mr. Ajay, who have invested 40% in security X, 35% in Y and 25% in Z by forming a portfolio. The risk and return profile is available.

	X	Y	Z
Return ($\bar{r}$)	12%	14%	10%
Risk (σ)	8%	12%	14%
	$\rho_{xy} = 0.03$,	$\rho_{yz} = 0.21$,	$\rho_{zx} = 0.16$

Calculate portfolio return and risk.

Solution :

Given that,

$W_x = 0.40$; $W_y = 0.35$, $W_z = 0.25$

$r_p = (W_x r_x) + (W_y r_y) + (W_z r_z)$

$= (0.4 \times 12) + (0.35 \times 14) + (0.25 \times 10)$

$= 4.8 + 4.9 + 2.5$

$= 12.2\%$

$\rho_p = \left[W_x^2 \sigma_x^2 + W_y^2 \sigma_y^2 + W_z^2 \sigma_z^2 + 2\rho_{xy} W_x W_y \sigma_x \sigma_y + 2\rho_{yz} W_y W_z \sigma_y \sigma_z + 2\rho_{zx} W_z W_x \sigma_z \sigma_x \right]^{1/2}$

$= [(0.4^2 \times 8^2) + (0.35^2 \times 12^2) + (0.25^2 \times 14^2) + (2 \times 0.03 \times 0.4 \times 0.35 \times 8 \times 12)$

$+ (2 \times 0.21 \times 0.35 \times 0.25 \times 12 \times 14) + (2 \times 0.16 \times 0.25 \times 0.4 \times 14 \times 8)]^{1/2}$

$= [10.24 + 17.64 + 12.25 + 0.8064 + 6.174 + 3.584]^{1/2}$

$= \sqrt{50.6944}$

$= 7.12\%$

1.5 THE CONCEPT OF RISK

Q15. Explain briefly the concept of risk.

Answer :

Risk

For answer refer Unit-1, Page No. 1.12, Q.No. 10, Topic: Risk.

The most common measure of risk of a security are the standard deviation and variance of returns.

Standard deviation (commonly denoted as σ) of returns measures the extent of deviation of returns from the average value of return. Precisely, standard deviation of return is the square root of the average of squares of deviation of the observed returns from their expected value of returns.

The square of standard deviation is called as variance and commonly denoted as σ^2. The variance is computed as follows.

Variance, $\sigma^2 = P_1 (r_1 - \bar{r})^2 + P_2 (r_2 - \bar{r})^2 + \dots + P_n (r_n - \bar{r})^2$

And $\sigma = \sqrt{Variance}$

Risk is associated with uncertainty. For taking an investment decision two things are taken into account by an investor i.e., the return from the investment made and the risk taken for getting that return. The risk can be huge or low as it depends upon the investment made because for having good return there will be possibility that the risk linked with that investment proposal could be high.

In simple words, it can be stated as risk is that in which there can be possibility that investor's expected returns don't match up with the actual outcome. There is a specific variability in causing of risk and this variability is defined in the types of risk.

1.5.1   Sources of Risk

Q16.   Explain various causes of risk.

Model Paper-II, Q6(a)

OR

What are the root sources of risk?

Answer :

The various sources of risk are as follows,

1.   Interest Rate Risk

The changes that are brought in the returns of securities due to variability in the interest rates is called as interest rate risk. The interest rate risk is caused when the rate of interest goes up then it decreases the market value of investment. The interest rate risk is tolerated by the bank by choosing it, it is not being accepted as unexpectedly.

An organization while offering financial services got ready to face risk, confirms that should manage it without difficulty instead of getting it converted into any other unwanted risk.

2.   Market Risk

Firm faces market risk when values fluctuate due to market factors. Market factors include market interest rates, equity prices, foreign exchange rates and commodity prices. Usually, referred to as systematic risk, non diversifiable risk or beta risk.

3.   Inflation Risk

This risk is linked with interest rate risk. An increase in inflation lead to an increased in interest rates. So, the inflation risk is caused when the changes in the economy is uncertain.

4.   Financial Risk

It arises when firms make use of debt financing as a source of finance. Financial risk involves the aspect of financial leverage. In financial risk, other things being constant, while purchasing assets if the amount borrowed is more, then returns would tend to fluctuate more.

5.   Business Risk

A change in sales affects to the earnings before interest and tax. Due to this, a business enterprise faces the risk of a decrease in firm value. When the value of the firm decreases then it reflects to the shareholders value.

6.   Liquidity Risk

When a firm is not able to purchase or sell a particular product within a short span of time, being its value unchanged, then it is referred as liquidity risk. To operate the business smoothly it is very essential for any firm to possess liquidity.

7.   Country Risk

Organization faces country risk when it plans to operate its business internationally either by investing or by lending in foreign countries. It is also known as sovereign risk. Country risk includes economic and political factors.

8.   Foreign Exchange Risk or Exchange Rate Risk

When business operates internationally then the currency value tend to change in the foreign exchange is called as exchange rate risk. The changes in currency rates occur due to the uncertainties in the global markets. And the firm's value get affected by this changes in currency value.

1.5.2   Types of Risk

Q17.   Explain briefly about the various types of risk.

Answer :

Total risk is the main component of investment decisions. It have been classified into two due to unsteadiness in returns. They are,

1.   Systematic risk and
2.   Unsystematic risk.
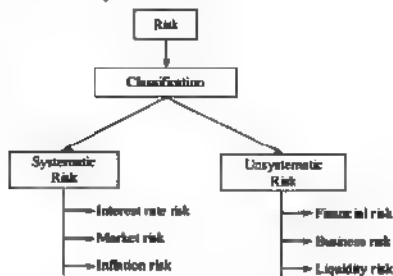
Figure

General risk + Specific risk
Systematic risk + Unsystematic risk $\Big\}$ Total risk
Market risk + Non-market risk
Undiversified + Diversified

1.   Systematic Risk (Non-diversifiable)

Systematic risk is that risk where the changes in total returns from the securities is directly influenced by changes in the general market or an economy as a whole. The systematic risk is also called as market risk. The systematic risk includes various sources of risk. They are,

(i)   Interest rate risk
(ii)   Market risk
(iii) Inflation risk.

No investor can avoid this risk even though he is much more efficient, he does not has control over the risk associated with overall market

Example

If the stock market declines the stocks of most of the companies will be affected and vice versa irrespective of the efficiency of any investor.

2. Unsystematic Risk

Unsystematic risk is that risk, in which the changes in the market circumstances does not influence the returns of securities. This risk is also called as non-market risk. This risk is peculiar to a specific security and is linked with determinants like,

(i) Financial risk

(ii) Business risk

(iii) Liquidity risk.

Q18. Define risk and distinguish between systematic and unsystematic risk.

Answer :

Risk

For answer refer Unit-I, Page No. 1.12, Q.No. 10, Topic: Risk.

Differences Between Systematic and Unsystematic Risk

	Basis of Comparison	Systematic Risk	Unsystematic Risk
1	Meaning	Systematic risk refers to the possibility of loss associated with market as a whole.	Unsystematic risk refers to a risk associated with a specific industry or security.
2.	Nature	This type of risk is uncontrollable.	This type of risk is controllable.
3.	Other name	It is also known as non-diversifiable risk or market risk or general risk.	It is also known as diversifiable risk, non-market risk or specific risk.
4	Influencing factors	It may arise due to macro-economic factors.	It may arise due to micro-economic factors.
5.	Ways to eliminate risk	This risk is eliminated through several ways such as diversification, hedging and asset allocation.	This risk is eliminated through portfolio diversification.
6.	Affects	If can affect a large number of securities in the market.	If affects securities of a particular firm or company.
7	Types	It is sub-divided into three categories, 1. Market risk 2 Interest Rate risk 3. Purchasing Power risk	It is also classified into three categories i.e., 1 Financial risk 2. Business risk 3 Liquidity risk
8	Focus of Investors	Investors usually don't try to work with this type of risk.	Investors try to minimize unsystematic risk by better managing their investment.
9.	Examples	1. Economic and political instability adversely affects all industries and companies. 2. Change in oil price or change in market interest rate 3. Unemployment rate.	1. Raw material scarcity. 2. Labour strike 3. Management inefficiency 4 Employee turnover 5 Increase in business operational cost.

1.5.3 Measurement of Risk – Range, Standard Deviation and Coefficient of Variation

Q19. Explain the concept of measurement of risk through systematic and unsystematic risk. Also discuss risk reduction by diversification.

Answer :

According to portfolio theory, the total risk (variance) is not the relevant risk in the portfolio context because the riskiness of a security when held in isolation is not same as the riskiness of a portfolio of securities.

The risk or variability in the profits of a firm is caused by factors to an industry (business risk) as well as by factors those are specific to a firm (firm specific risk) in that industry

However, business and firm specific risk is to be viewed in terms of unsystematic and systematic risks.

Unsystematic risk is the extent of variability in the securities return on account of the firm specific risk factors.

This is diversifiable or avoidable because it is possible to eliminate or diversify away this component of risk to a considerable extent by investing in a large portfolio of securities.

The unsystematic risk stems from managerial inefficiency, techno ogical change in the production processes, labour problems etc., the nature and magnitude of those factors differ from one company to another

Systematic risk affects the entire market. It arises from the factors which are beyond the control of the corporate and the investor. They cannot be entirely avoided by the investor and so can also be termed as non-diversifiable risk

For example, a steep increase in the international crude oil prices is almost certain to affect the entire market adversely

Hence, no amount of diversification can make a portfolio totally free from such risk

Therefore, this leve. of systematic risk below which riskiness of a portfolio cannot be reduced is also called as unavoidable risk

Risk Reduction by Diversification

Further, from the point of view of an investor whose portfolio is well diversified, the diversifiable risk is of no importance as it gets eliminated but non-diversifiable risk arising from market wide movements of security prices is highly important.

This vulnerability is measured by the sensitivity of the return of the security vis-a-vis the market return and is denoted by Greek letter Beta (β).

Figure (1)

Beta (β)
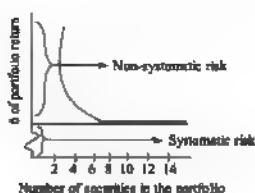
It is frequently referred to as the measure of a security's systematic risk or market risk, since it indicates the manner in which a security's returns changes systematically with the changes in the market returns. The higher the value of the β, the higher the riskiness of a security

A β2 implies that, if the market return increases or decreases by 1% over a period, the security return increases or decreases respectively by 2%.

The beta of a portfolio can be estimated as a weighted average of the betas of the individual securities in the portfolio.

$$\beta = \sum_{i=1}^{n} \beta_i W_i$$

The ex-post beta is calculated using historical data by the following equation,

$$\beta_i = \frac{\left(N \sum_i r_i r_m\right) - \left(\sum_i r_m\right)\left(\sum_i r_i\right)}{\left(N \sum_i r_m^2\right) - \left(\sum_i r_m\right)^2} \text{ or } \frac{Cov_{im}}{\sigma_m^2}$$

$$\text{Where, } Cov_{im} = \frac{\sum_{i=1}^{n}(r_{it} - \overline{r}_i)(r_{mt} - \overline{r}_m)}{n}$$

The security return on any day is defined as today's return.

$$h_i = \frac{\text{Today's price} - \text{Yesterday's price}}{\text{Yesterday's price}}$$

Similarly, the market return on any day is defined as, todays market return.

$$r_m = \frac{\text{Today's index} - \text{Yesterday's index}}{\text{Yesterday's index}}$$

Like daily returns, weekly or monthly returns can also be calculated. The characteristic regression line or CRL is a simple linear regression model estimated for a particular stock against the market index return to measure diversifiable risk and undiversifiable risk.

The model is as follows,

$$r_i = \alpha_i + \beta_i r_m + e_i$$

Where,

r_i = Return of the ith stock

α_i = Intercept (i.e., the stock's independence of the market return)

β_i = Systematic risk of ith stock

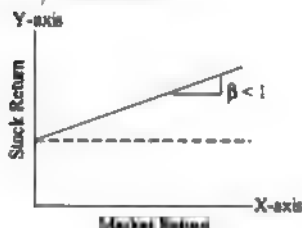r_m = Return of the market index and

e_i = Error item.

Figure (2): Systematic Risk is Same as Market
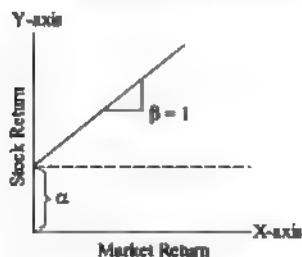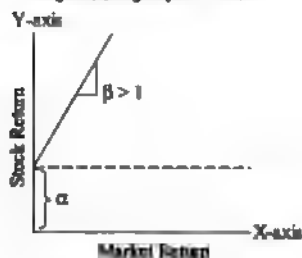

Figure (3): High Systematic Risk

Figure (4): Low Systematic Risk

Here α_i (alpha coefficient) measures the ith assets rate of return when the market return (r_m) is equal to zero.

It indicates that the stock return is independent of the market return. In a well diversified portfolio the average value of alpha of all stocks turns on to be zero.

Q20. How risk is measured through range, standard deviation and co-efficient of variation?

Answer :

The risk of portfolio can be measured through the following concepts or techniques,

1. Range

It is one of the easiest and simplest methods of studying dispersion. Range is defined as the difference between the value of the largest item and the smallest item of the distribution.

$$\boxed{Range = L - S}$$

Where,

L = Largest item in the distribution

S = Smallest item in the distribution.

$$\text{Co-efficient of Range} = \frac{L-S}{L+S}$$

2. Standard Deviation

Karl Pearson introduced the concept of standard deviation in the year 1823. It is widely used as a method of dispersion and satisfies most of the properties which helps in measuring dispersion. It is also called "root mean square deviation". It is represented by small Greek letter 'σ'. It is useful in measuring the absolute dispersion and judging the representativeness of the mean.

The Standard Deviation (SD) is also considered as variance or with symbol σ. It is calculated by following formulae,

Portfolio Risk,

$$\sigma_p = \sqrt{w_x^2 \sigma_x^2 + w_y^2 \sigma_y^2 + 2w_x \, w_y \, p_{xy} \sigma_x \sigma_y}$$

3. Co-efficient of Variation

When Standard Deviation (SD) (σ) is divided by expected returns (i.e., Mean or Expected Return (ER)) Co-efficient of Variation (COV) is obtained. Co-efficient of variation is useful for comparing risks of two projects or securities with different sizes. Less amount of Co-efficient of variation is considered as good one. The formula to calculate Co-efficient of variation is, $COV = \dfrac{\sigma}{ER}$.

PROBLEMS

1. A company manages a stock fund consisting of fund stocks with the following market values and betas.

Stock	Market Value	Beta
P	1,00,000	1.10
Q	50,000	1.20
R	75,000	0.75
S	1,25,000	0.80
T	1,50,000	1.40
	5,00,000	

Calculate beta of the portfolio.

Solution :   *Model Paper-II, Q6(b)*

Determination of Beta of the Portfolio

Stock	Market Value $[\Pi]$	Weight (w_i)	r_i (%)	$w \times r_i (\beta_i)$
P	1,00,000	$\frac{1,00,000}{5,00,000} = 0.20$	1.10	0.2200
Q	50,000	$\frac{50,000}{5,00,000} = 0.10$	1.20	0.1200
R	75,000	$\frac{75,000}{5,00,000} = 0.15$	0.75	0.1125
S	1,25,000	$\frac{1,25,000}{5,00,000} = 0.25$	0.80	0.2000
T	1,50,000	$\frac{1,50,000}{5,00,000} = 0.30$	1.40	0.4200
	5,00,000			1.0725

$$\beta_p = \sum_{i=1}^{N} N_i \beta_i$$

$$\approx 1.0725 \times 5$$

$$= 5.3625$$

2. The annual rates of return for the Jarvis Corporation and the market are given below.

Year	Return on Jarvis	Return on market
19 × 1	–5%	–8%
19 × 2	14	16
19 × 3	10	12
19 × 4	12	14
19 × 5	17	20

Determine the beta coefficient for Jarvis Corporation.

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Solution :

Determination of Beta Coefficient

Year	r_j	r_m	r_m^2	$r_j r_m$
19 × 1	5	6	36	30
19 × 2	14	16	256	224
19 × 3	10	12	144	120
19 × 4	12	14	196	168
19 × 5	17	20	400	340
	48	56	1032	882

$$\beta = \frac{\left(N\sum_i r_i r_m\right) - \left(\sum_i r_m\right)\left(\sum_i r_j\right)}{\left(N\sum_i r_m^2\right) - \left(\sum_i r_m\right)^2}$$

$$= \frac{[(5)(882)] - [(56)(48)]}{[(5)(1032)] - [(56)^2]}$$

$$= \frac{44\ 0 - 2688}{5160 - 3136} = \frac{1722}{2024}$$

$$0\ 85$$

∴ The beta coefficient for Jarvis corporation is 0.85

3. **Determine beta of Bajaj Auto from the following data.**

Date	Bajaj Auto	NSE Index
October 5	597.50	904.85
October 6	570.80	845.75
October 8	582.95	874.25
October 9	559.60	849.10
October 12	545.10	835.80
October 13	519.15	816.75
October 14	560.70	843.55
October 15	560.95	835.55
October 16	597.40	839.50

Also compute alpha of the security.

Solution :

Formula

The calculation of r_m and r_j

$$\frac{\text{Current price} - \text{Previous price}}{\text{Previous price}} \times 100$$

Determination of Beta and Alpha of Bajaj Auto

$r_i(\%)$	$r_m(\%)$	r_m^2	$r_i r_m$
-	-	-	-
4.47	6.54	42.77	29.23
2.13	3.37	11.36	7.18
4.01	2.88	8.29	11.55
2.59	-1.57	2.46	4.07
4.76	2.28	5.20	10.85
8.00	3.28	10.76	26.24
0.04	-0.95	0.90	-0.04
6.50	0.47	0.22	3.06
$\Sigma r_i = 0.84$	$\Sigma r_m = -7.1$	$\Sigma r_m^2 = 81.96$	$\Sigma r_i r_m = 92.14$

$$\bar{r}_i = \frac{0.84}{9} = 0.09$$

$$\bar{r}_m = \frac{-7}{9} = -0.79$$

$$\beta = \frac{\left(N\sum r_i r_m\right) - \left(\sum r_m\right)\left(\sum r_i\right)}{\left(N\sum r_m^2\right) - \left(\sum r_m\right)^2}$$

$$\beta = \frac{9(92.14) - (-7.1)(0.84)}{9(81.96) - (-7.1)^2}$$

$$\beta = \frac{829.26 - (-5.964)}{737.64 - 50.41}$$

$$= \frac{835.22}{687.23}$$

$\boxed{\therefore \beta = 1.22}$

$$\alpha = \bar{r}_i - \beta \bar{r}_m$$

$$0.09 - [1.22(-0.79)]$$

$$= 0.09 + 0.9638$$

$\boxed{\therefore \alpha = 1.05}$

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1.5.4 Risk-return Trade-off

Q21. Explain the concept of risk-return trade-off.

Answer :

While making the decisions regarding investment and financing, the finance manager seeks to achieve the right balance between risk and return. If the firm borrows heavily to finance its operations, then the surplus generated out of operations would be sufficient to service the debt in the form of interest and principal payments

The surplus or profit available to the owners would be reduced because of heavy 'debt-servicing'. If things do not work out as planned and the firm is unable to meet its obligations, the company is even exposed to the risk of insolvency

Similarly, the various investment opportunities have a certain amount of risk associated with the return and also the time when the return would materialize

The finance manager has to decide whether the opportunity is worth more than its cost, and whether the additional burden of debt can be safely borne.

In fact, decision making in all areas of management including financial management involves the balancing of the trade-off between risk and return.

The following decisions are involved in risk return trade-off,

1. Capital budgeting
2. Capital structure
3. Working capital management
4. Dividend.

1.5.5 Risk Premium and Risk Aversion

Q22. How risk premium is different from risk aversion?

Answer :

Risk Premium

It is an extra return over the risk free rate expected by investors to repay them for holding an asset with a certain degree of changes. The risk premium is an important concept used in planning long-term asset mix. The size of the risk premium depends on the importance and possibility of the alternatives that the individual faces.

In simple words, risk premium is a extra sum payable or return to compensate a party for adopting a particular risk.

The risk premium measures the pay-off for taking several types of risk, this premium can be estimated between any two classes of securities

The amount of the risk premium is controversial, with varying estimates of actual risk premium in past and also prospective risk premium is future. It indicates how much additional interest people must earn inorder to hold the risk bonds.

Example

Equity Risk Premium (ERP) can be calculated by using,

$$ERP = \frac{(1 + TR_{cs})}{(1 + R_F)} -$$

Where,

ERP = Equity risk premium

TR_{cs} = Total return on stocks

R_f = Risk free rate.

Risk Aversion

Risk aversion refers to the technique in which the investor choose the one project which is less risker from the other investment projects. If two investment projects have similar cost and expected return is also same, but the return from one of the project is less certain and the return from the other project is more certain, then the project containing high certainty will be selected.

In simple words, when the investor give preference to the less risky investment from the other projects of identical expected returns, it is called as risk aversion. The fundamentals of risk aversion is adopted for making the task easier and it is also used for facilitating the examining process of investment proposals. Risk averse investors accepts lower expected returns projects in order to have less risk.

Therefore, risk aversion is a process used for selecting the one good alternative from the other investment proposals to avoid uncertainty.

1.6 APPROACHES TO INVESTMENT ANALYSIS

Q23. Explain the various approaches to investment analysis.

Answer :   *Model Paper-III, Q6(a)*

For answer refer Unit-I, Page Nos. 1.29 and 1.33, Q.Nos. 24 and 26.

1.6.1 Fundamental Analysis

Q24. What are the different analysis that must be carried out under fundamental analysis?

Answer :

Fundamental Analysis

Fundamental analysis is an approach to determine what ought to be price otherwise known as "intrinsic" or "true" value of a security.

Fundamental analysis is based on the premise that a security has an intrinsic value at any given time. The intrinsic value of a security depends on a multitude of factors like the earnings of a company, the growth rate, its products, its management, the risk exposure, the economic and industrial environment in which the company is operating. By assuming these fundamental determinants governing performance of the company, it is possible to determine an estimate of its intrinsic value.

The proper order in which to proceed in fundamental analysis is, first to analyze the overall economy and security markets. Second, analyze the industry within which a particular company, operates. Finally, the analysis of the company should be considered.

1. Economic Analysis

The level of economic activity has an impact on investment in many ways. If the economy grows rapidly, the industry can also be expected to show rapid growth and vice-versa.

When the level of economic activity is low, stock prices are low, and when the level of economic activity is high, stock prices are high reflecting the prosperous outlook for sales and profits of the firms. Therefore, the analysis of macro economic environment is essential to understand the behavior of the stock prices.

Factors Analyzed in Economic Analysis

The commonly analyzed macro economic factors are as follows,

(i) Gross Domestic Product (GDP)

GDP indicates the rate of growth of the economy. It represents aggregate value of the goods and services produced in the economy. The GDP growth of economy points out the prospects for the industrial sector and return investors can expect from investment in shares. The higher growth rate is more favourable to the stock market.

(ii) Savings and Investment

Stock market is a channel through which the savings of the investors are made available to the corporate bodies. Savings are distributed over various assets like equity shares, deposits, mutual funds units, real estate and bullion. The savings and investment patterns of the public, affect the stock to a great extent.

(iii) Inflation

With the increase in inflation rate, the real rate of growth would be very little. The demand in the consumer product industry is significantly affected. If there is a mild level of inflation, it is good to the stock market but high rate of inflation is harmful to the stock market.

(iv) Interest Rates

The interest rate affects the cost of financing to the firms. A decrease in interest rate implies lower cost of finance for firms and more profitability. Availability of cheap fund, encourages speculation and rise in the price of shares.

(v) Budget

The budget draft provides an elaborate account of the government revenues and expenditure. A deficit budget may lead to high rate of inflation and adversely affect the cost of production. Surplus budget may result in deflation. Hence, balanced budget is highly favourable to the stock market.

(vi) Tax Structure

Every year in March, the business community eagerly awaits the governments announcement regarding the tax policy. Tax reliefs given to savings encourage savings. The type of tax exemption has impact on the profitability of the industries.

(vii) Balance of Payment

The balance of payment is the record of a country's money receipts from and payments abroad. The difference between receipts and payments may be surplus or deficit. Balance of payment is a measure of the strength of rupee on external account. A favourable balance of payment renders a positive effect on the stock market.

(viii) Monsoon and Agriculture

Agriculture is directly and indirectly linked with the industries. For example, sugar, cotton, textile and food processing industries depend upon agriculture for raw material. Fertilizer and insecticide industries are supplying inputs to the agriculture. A good monsoon leads to higher demand for inputs and results in bumper crop. When the monsoon is bad, agricultural and hydel power production would suffer. They cast a shadow on the share market.

(ix) Infrastructure Facilities

Infrastructure facilities are essential for the growth of industrial and agricultural sector. A wide network of communication system is a must for the growth of the economy. Regular supply of power without any power cut would boost the production. Banking and financial sectors also should be sound enough to provide adequate support to the industry and agriculture. Good infrastructure facilities affect the stock market favorably.

(x) Demographic Factors

The demographic data provides details about the population by age, occupation, literacy and geographic location. This is needed to forecast the demand for the consumer goods. The population by age indicates the availability of able work force. The cheap labour force in India has encouraged many multinationals to start their ventures. Indian labour is cheaper compared to the western labour force. Population, by providing labour and demand for products, affects the industry and stock market.

2. Industry Analysis

An industry is a group of firms that have similar technological structure of production and produce similar products. An analysis of industry helps in identifying opportunities for investment purpose and this requires careful assessment of its ability to maintain its profitability in the long run to deserve investment.

It starts with the evaluation of the following factors associated with the industry such as past sales and earnings, growth of the industry, the attitude of the government towards the industry, labour conditions, competition, cost structure and finally research and developments in the industry. All of these factors themselves would become strengths, weakness, opportunity and threat for the industry. Hence, the investor should carry out a SWOT analysis for the chosen industry.

(A) Industry Life Cycle

The industry life cycle theory generally attributed to Julius Grodensky. It consist of the following four separate stages,

(i) Pioneering Stage

The prospective demand for the product is promising in this stage and the demand for the product attracts many producers to produce the particular product leading to severe competition. This stage may offer higher returns to the investor but also offers the greatest risk.

(ii) Rapid Growth Stage

This stage starts with the appearance of surviving firms from the pioneering stage. These companies grow strongly in market share and financial performance as the cost of production is low and they have good quality products. It is advisable to invest in the shares of these companies because of growth in potential, returns and decrease in the risk of failure.

(iii) Maturity and Stabilization Stage

In this stage, the growth rate tends to be moderate Sales may increase but at a slower rate than before. Symptoms of obsolescence may appear in the technology Products may become more standardised and less innovative and the market place is full of competitors. Earnings are stable and hence investors may get high dividend but must be avoided by those who are primary interested in capital gains.

(iv) Declining Stage

The demand for the product and earnings decline in this stage It is better to avoid investing in the shares of these industry staged companies as it will lead to erosion of capital.
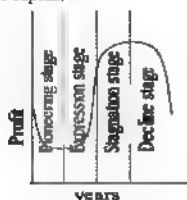
Figure: Industry Life Cycle

(B) Business Cycle

The other way to analyze industries is by their operating ability in relation to the economy as a whole and that is classifying industries on the basis of the business cycle. There are three stages of business cycle. They are,

(i) Growth Industry

In growth industries, earnings are expected to be above the average of all industries and such growth occur regardless of setbacks of the economy.

(ii) Cyclical Industry

The industries are mostly volatile and companies do well when the economy prospers and during depression they suffer a setback.

(iii) Defensive Industry

They are least affected by recessions and economic adversity The stocks of the defensive industries can be held by the investor for income earning purpose

3. Company Analysis

Company analysis is the final stage of fundamental analysis. The economy analysis provides the investor a broad outline of the prospects of growth in the economy The industry analysis helps investor to select the industry in which investment would be rewarding After this, he has to decide the company in which he should invest his money Company analysis provides the answer to this question.

Company analysis deals with the estimation of return and risk of individual shares. This calls for information regarding companies which can be broadly classified into two broad groups, internal and external. Internal information consists of data and events made public by companies concerning their operations The internal information sources include annual reports to shareholders, public and private statements of officers of the company, the company's financial statements, etc. External sources of information are those generated independently outside the company These are prepared by investment services and the financial press.

In company analysis, the analyst tries to forecast the future earnings of the company because there is strong evidence that earnings have a direct and powerful effect upon share prices.

(A) Financial Statements

The prosperity of a company would depend upon its profitability and financial health. The financial statements published by the company periodically help us to assess the profitability and financial health of the company. The two basic statements provided by the company are as follows,

(i) Balance Sheet

It helps to assess the financial position of the company at a particular point of time It shows the list of assets and liabilities of a company on a specific date.

(ii) Profit and Loss Account

It determines the performance of the company during a particular period. It reveals the revenue earned, the cost incurred and the resulting profit or loss of the company

(B) Analysis of Financial Statements

The analysis of financial statements reveals the nature of relationship between income and expenditure, the sources and application of funds This can be done by using the following,

(i) Comparative Financial Statements

In the comparative statement, balance sheet figures are provided for more than one year The comparative financial statement provides time perspective to the balance sheet figures. The annual data are compared with similar data of previous years, either in absolute terms or in percentages.

(ii) Trend Analysis

Here percentages are calculated with a base year This would provide insight into growth or decline of the sale or profit over the years Here in, the investor has to look into the cost and management efficiency of the company by examining the trends prevailing.

(III) Common Size Statement

Common size balance sheet shows the percentage of each asset item to the total assets and each liability item to the total liabilities. Similarly, a common size income statement shows each item of expense as a percentage of net sales. With common size statements comparison can be made between two different size firms belonging to the same industry.

(iv) Funds Flow Analysis

This statement provides an insight into the movement of funds and helps in understanding the changes in the structure of assets, liabilities and owners equity. It reveals how funds have been raised and used during an accounting period.

(v) Cash Flow Analysis

It categorically provides an insight into the inflow and outflow of cash during an accounting period. It shows changes in cash balance between the two balance sheet dates.

(vi) Ratio Analysis

It helps an investor to determine the strengths and weakness of a company by establishing the relationship between various elements of financial statements. Different ratios measures different aspects of a company's health. Four groups of ratios are as follows,

❖ **Liquidity Ratios**

These measures the company's ability to fulfil its short-term obligations and reflects its short-term financial strength.

❖ **Leverage Ratios**

These ratios are also known as capital structure ratios. They measure the company's ability to meet its long-term debt obligations.

❖ **Profitability Ratios**

The profitability of a company can be measured by the profitability ratios. These ratios are calculated by relating the profits either to sales, or to investment, or to the equity shares.

❖ **Activity Ratios**

These are also known as turnover ratios. These ratios measure the efficiency in asset management.

(C) Assessment of Risk

Company analysis involves not only an estimation of future returns but also an assessment of the variability in returns called risk. The variability in returns arises primarily because of variability in sales. The sensitivity of profits of changes in the level of sales is measured by a ratio called Degree of Total Leverage (DTL). This ratio is used as a measure of risk. It is calculated as follows,

$$DTL = \frac{Contribution}{Profit\ Before\ Tax\ (PBT)}$$

It may be noted that contribution means sales minus the variable cost. DTL may be subdivided into two components,

(i) The Degree of Operating leverage (DOL) arising from the cost structure of the company and

(ii) The Degree of Financial Leverage (DFL) arising from the capital structure of the company.

DOL measures the percentage change in EBIT for a 1% change in sales and is computed as,

$$DOL = \frac{Contribution}{EBIT}$$

DFL measures the percentage change in PBT for a 1% change in EBIT and is computed as,

$$DFL = \frac{EBIT}{PBT}$$

The Degree of Total Leverage (DTL) is the product of DOL and DFL and measures the percentage change in PBT for a 1% change in sales.

(D) Non-financial Parameters

The important non-financial parameters to be examined by an investor are as follows,

(i) Top Management

The quality of top management team, particularly, the competence and the commitment of the chief executive officer matters a lot in shaping the destiny of the company.

(ii) Product Range

Progressive companies like ITC and Hindustan Lever creates competition for their existing products by launching new product with regular frequency. Hence, investors must examine whether the company under review belongs to this group or not.

(iii) Foreign Collaboration

When a company has entered into technical collaboration with a foreign company, the investor must find out more about the nature of the collaboration agreement.

(iv) Research and Development

Progressive companies spend substantial sum of money on R and D to upgrade their existing products, introduce new products, adapt foreign technology to suit the local conditions, achieve import substitution etc.

(v) Governmental Regulations

The investor must assess the implication of governmental regulation such as MRTP act, FERA etc, for the company under review.

The investment decision is ultimately a decision to invest in the shares of one or more specific companies. Company analysis deals with an analysis of various factors affecting the performance of companies so as to forecast the future earning of a company is also its variability better known as risk.

Q25. Explain the significance and components in fundamental analysis.

Answer : *Dec.-12/Jan.13, Q2(b)*

Significance of Fundamental Analysis

The believes or significance of fundamental analysis can be easily understood with the help of the following points,

1. Fundamental analysis basically focus upon analyzing the fundamental or primary factors that play a vital role in influencing the risk return of the securities.

2. It specifically aims at identifying the securities in the stock market which have been mispriced.

3. This means the market price of the security and the price is judged by considering the fundamental factors known as "intrinsic value" which is usually not same and the market place gives a chance to the discerning investor to identify such type of discrepancy immediately after identifying such a description an investment decision is taken. If in case the security whose market price is higher than its intrinsic value will be sold by the investor in order to gain profits. Likewise securities whose market price is less than its intrinsic value will be purchased.

4. The economy, industry and company framework of fundamental analysis would give a clear idea to the investor as to whether invest or not in the securities.

5. In fundamental analysis, the economic analysis helps in evaluating the past and present performances of various sectors of the economy and also forecasts the future performance of each sector.

6. In fundamental analysis, the industry analysis helps in understanding the investment capability of each firm.

7. In fundamental analysis, the company analysis facilitates in ascertaining the financial position of a company. The analyst takes into account the internal (data and events publicized by the company) as well as the external (reports made by media etc) information relating to that particular company.

From the above points it is clearly understood that, the fundamental analysis is an effective tool which presents the complete picture, (Economy-industry-company) of the company for making the investment decisions.

Components of Fundamental Analysis

Economy analysis, industry analysis and company analysis are the major components of fundamental analysis. They are also regarded as special steps, that facilitates in making investment decisions.

For remaining answer refer Unit-I, Page Nos. 1 29, Q No. 24. Topics: Economic Analysis, Industry Analysis, Company Analysis.

1.4.2 Technical Analysis

Q26. Explain in brief about technical analysis.

Answer :

Technical analysis studies the characteristics which may be expected at major market turning points and their objective assessment. It provides information about future stock price movements by taking historical price movements of shares into its consideration.

The rational behind technical analysis is that share price behaviour repeats itself overtime and the analyst attempts to drive methods to predict this repetition so that buying and selling decisions of shares can be made.

The technical analyst believes that share prices are determined by the demand and supply forces operating in the market. These demand and supply forces in turns are influenced by a number of fundamental factors as well as psychological or emotional factors. Many of these factors cannot be quantified.

The combined impact of all these factors is reflected in the share price movements. Technical analyst have developed tools and techniques to study past patterns and predict future price.

Assumptions

The basic assumptions underlying technical analysis are as follows,

1. Market value is determined solely by the interaction of supply and demand.

2. Supply and demand are governed by numerous factors, both rational and irrational.

3. Ignoring minor fluctuations in the market, stock prices, tend to move in trends which persist for an appreciable length of time

4. Changes in trend are caused by shifts in supply and demand.

5. Shift in supply and demand, no matter why they occur, can be detected sooner or later in charts of market value

6. Some chart patterns tend to repeat themselves.

Factors to be Considered in Technical Analysis

Technical analysis is done by considering following factors,

1. Price

Changes in price reflect changes in investor attitude and demand for and supply of securities.

2. Time

The degree of movement in price is a function of time. The longer it takes for a reversal in trend, the greater the price change that would follow.

3. Volume

The intensity of price changes is reflected in the volume of transactions that accompany the change. An increase in price accompanied by a low volume implies that the change is not strong enough.

4. Breadth

The quality of price change is measured by studying whether a change in trend spreads across most sectors and industries or is concentrated in few scripts. Study of the breadth of the market indicates the extent to which price changes have taken place in the market in accordance with a certain overall trend.

5. Charts

The basic tool in technical analysis is movement in prices, measured by charts. The graphical presentation of data of price movements of shares are known as charts.

They are the valuable and easiest tools as it helps the investor to find out the trend of the price without any difficulty. The charts have the following uses,

(i) They spot the current trend for buying and selling.

(ii) Indicates the probable future action of the market by projections.

(iii) Shows the past historic movements.

(iv) Indicates the important areas of support and resistance.

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1.6.2.1 Methods of Technical Analysis

Q27. Explain dow theory, volume indicators and moving averages.

Answer :

The methods of technical analysis can be studied under following types,

(a) Dow Theory

(b) Volume Indicators

(c) Moving Averages.

(a) Dow Theory

Dow theory was propounded by Charles H. Dow in 1900. This theory seeks to study the major movements in the market with a view to establish trends which exist until a reversal occurs. It does not attempt to forecast future price movements or estimate either the duration or the size of such market trends. This theory is based on certain hypothesis as,

❖ No single individual or buyer can influence the major trend of the market. However, an individual investor can affect daily price movement by buying or selling huge quantum of particular scrip. The intermediate price movement also can be affected to a lesser degree by an investor.

❖ The market discounts everything. Even natural calamities such as earthquake, plague and fire also get quickly discounted in the market. The Pokhran blast affected the share market for a short while and then the market returned back to normal.

❖ The theory is not infallible. It is not a tool to beat the market but provides a way to understand it better.

Measures

Six basic tenets (measures) of the Dow theory are as follows,

1. The Average Discounts Everything

The share prices that are determined in the market evolve out of a discounting process that takes all known and predictable factors into account

2. The Market has three Movements

The Dow theory classifies the movements in stock prices into three categories,

(I) Primary Movements

The movements which last from about a year to several years, represent a major market trend and is known as primary movement. It can be either bull or bear market trend.

♦ Bull markets are where prices move in an upward manner for several years.

♦ Bear markets are where prices move in downward manner for several years.

The primary movements are interrupted by rallies or reversal

♦ A rally is an increase in price that occurs after a falling trend in prices.

♦ A reversal is a decrease in price that occurs after a rise in prices.

(ii) Secondary Movements

These are ups and downs of stock prices that last for few months and are also called as correlations

(iii) Minor Movements

These are meaningless random daily fluctuations of stock prices.

3. Price Action Determines the Trend

A trend can be called primarily bullish, when successive rallies lead to peaks that are higher than the preceeding ones, and when troughs reached by the intervening secondary reactions are above the preceding troughs. Similarly, a bearish trend is marked by a series of descending peaks and troughs. A reversal in primary trend is indicated when the above tenet does not hold.

4. Lines Indicate Movement

In certain cases, price movements which initially look like secondary reactions, persist within a narrow range, forming what is called in technical parlance as a line. A line is formed by price movements within a range of 5 percent of its mean average. This is called an 'Accumulation' (where a 'line' is formed in between a primary bear trend) or a 'Distribution' (where a line is formed in between a primary bull trend). If prices advance above an accumulation, it marks a reversal in the bearish trend, if prices continue to a fall after an accumulation, the line is only a consolidation of the bearish trend and is only a horizontal secondary movement. The converse is true for a distribution

5. Price/Volume Relationships Provide Background

The relationship between share prices and volume of shares traded is very important in technical analysis. Volume is normally expected to complement the movement in prices. A reversal in trend signalled if a low volume accompanies a rally, or a high volume, a reversal

6. The Averages must Confirm

An important tenet of the theory is that the averages must confirm each other. If the market is truly a barometer of future business conditions, the industry averages and market averages should move together

In a nut shell, the Dow theory concerns itself with determining the direction of the primary trend of the market, the identification of phases of the trend and any possible divergence in trend.

(b) Volume Indicators

Volume is a function of the demand for and supply of stocks and can signal turning points for the market as well as for individual stocks. During bull markets, volume increases with price advances and decreases with price declines

In a major downward price trend, the reverse will hold true volume will generally increase as prices decline and dwindle on price rallies. Further, volume generally falls in advance of major declines in the stock price averages and rise sharply during markets bottoms. Thus, forecasting price changes requires examination of the trend of price changes as well as fluctuations in volume of transactions.

(c) Moving Average

The market indices do not rise or fall in straight line. The upward and downward movements are interrupted by counter moves. The underlying trend can be studied by smoothening of the data. To smooth the data moving average technique is used.

Moving average technicians calculate a moving average price for a security and use that average as a benchmark to gauge the daily price movement of a security. One of the most commonly used moving average is the 200 days moving average.

The closing prices of a security are averaged for 200 days and then each day, the moving average changes as the most recent day is added and the two hundred and first day is deleted

Moving average analysis is used to tell a technician when to buy or sell a security. For example, a moving average analyst would recommend buying a stock when,

Stock 1

The prices of a stock move through a flattened moving line.

Stock 2

The stock's price falls below a moving average line that is rising.

Stock 3

The price of a stock that is above a moving average line falls but turns around and starts up before it ever reaches the moving average line

1.7 FUNDAMENTAL ANALYSIS VS TECHNICAL ANALYSIS

Q28. Compare and contrast fundamental and technical analysis.

Answer :

Differences between fundamental analysis and technical analysis are as follows,

	Fundamental Analysis		Technical Analysis
1	It analyses the stock based on the specific goals of the investor	1	It analyses stock on the basis of past history of prices
2.	It studies the financial strength of corporate, growth of sales, earnings and profitability. They also considers industry and economic conditions.	2.	Generally, it studies two basic market data i.e., price and volume of securities.
3	The fundamental analyst estimate the intrinsic value of shares. They suggest to purchase them, when they are undervalued and suggest to dispose when they are overpriced	3	The technical analyst mainly predict the short-term price movement rather than long term movement. The rallies and historical charts give buying and selling signals.
4	They are committed to buy and hold policy.	4.	They are not committed to buy and hold strategy.
5	They are of opinion that supply and demand of stock depend on the underlying fundamental factors of the company, industry and economy.	5	They are of opinion that demand and supply of stock depend on rational and irrational factors.
6.	This is a tedious process and rather takes a long time to complete the analysis.	6.	The whole process involves much less time and hence, facilitates timely decisions
7	It helps in identifying overvalued and undervalued securities and ignores time factor of an investment.	7	It helps in identifying the best timing of an investment i.e., the best time to buy or sell a security

1.8 EFFICIENT MARKET HYPOTHESIS

Q29. What is Efficient Market Hypothesis (EMH)? Explain three forms of EMH.

Answer :

Efficient Market Hypothesis (EMH)

Market efficiency signifies how quickly and accurately does relevant information has its effect on the asset prices.

Depending upon the degree of efficiency of a market or a sector there of, the returns earned by an investor will vary from the normal return.

The requirements for a stock market to be efficient are,

(i)   The investors must be rational and able to recognize efficient assets.

(ii) Information must be discussed freely and quickly across, so that all investors can react to new information.

(iii) Taxes are assumed to have no noticeable effect on investment policy

(iv) Transaction costs such as sales commissions on securities are ignored.

(v)   Every investor s allowed to borrow or lend at the same rate.

Thus, the expectations of the investor regarding the future cashflows are translated or reflected on the share prices. The accuracy and the quickness in which the market translates the expectation into prices are termed as market efficiency

The Random Walk Theory

In 1900, a French mathematician named Louis Bachelier published a paper suggesting that security price fluctuations were random. In 1953, Maurice Kendall in his paper reported that stock prices are wandering one

They appeared to be random and each successive change is independent of the previous one. Therefore, the movement of stock prices in a random and unpredictable manner is known as random walk of share prices

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The randomness in prices are determined by competitive forces and perfect information flow and are independent of the past prices.

Randomness in stock prices changes determines the expectations from a well-functioning stock market. It indicates that market participants act rather quickly to the news that is relevant to stock value and that stock price adjust rather quickly to these information motivated trades.

The more quickly stock prices adjust and reflect that affects value, the more efficient are the market prices. This is also referred to as efficient market theory.

In a nutshell, efficient market theory states that the share prices fluctuations are random and do not follow any regular pattern.

Forms of EMH

Market efficiency refers to the ability of financial assets to quickly adjust and reflect all information that is relevant to value in its price. The subject of market efficiency involves a thorough study of the efficient market hypothesis. Depending upon the level of information considered, there are three forms of EMH.

(a) Weak Form

Also known as random walk model, it says that current prices fully reflected all historical information, hence any attempt to predict prices based on historical price or information is totally futile as future price changes are independent of past price changes.

It is not surprising to note that the weak form holds good in any market, since even the critics of EMH will admit that prices adjust to an information albeit with a lag.

(b) Semi-strong Form

According to this form, current stock prices reflect all publicly available information such as earnings, stock and cash dividends, splits, mergers and takeovers, interest rate changes, etc.

It also says that prices adjust to such information quickly and accurately' so abnormal/superior profits on a consistent basis cannot be earned.

(c) Strong Form

According to the strong form, prices of securities fully reflect all available information both public and private i.e., if this form is true, prices reflect the information that is available to only selected groups like the management, financiers and stock exchange officials.

There are two versions of the strong form, the near strong form and the super strong form. As per the near strong form, conclusions and opinions drawn by analyst based on publicly available information is also reflected in the prices.
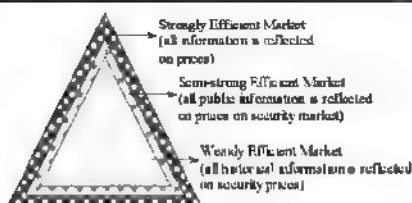
Figure: Levels of Information and Markets

The super strong form is more extreme and says that confidential information available only to select groups of people mentioned above is also of no use in obtaining abnormal returns, as the prices contain adjustment for that information as well.

As can be expected, the super strong form has been rejected by many, while the near strong form found some support.

Q30. Explain the assumptions, anomalies and effects of EMH.

Answer :

Assumptions of EMH

The price movements under Random walk theory (EMH) are randomly distributed, in such a way that the present steps are independent of past steps and in view of such random movements entry into the market any time gives same returns for the same risk to the investors.

Thus theory is based on the following assumptions.

1. Market is perfect and free without trade restrictions.
2. Market absorbs all the information quickly and efficiently.
3. Information is free and costless and is quickly available to all at the same time.
4. Information is unbiased and correct.
5. Market players can analyse the information quickly and the information is absorbed in the market through buy and sell signals.
6. Demand and supply pressures are absorbed in the market through price changes. Such absorption leads to promote quick (rapid) movements in prices but in a random fashion.

Anomalies of EMH

While a large number of studies support the efficient market hypothesis at the semistrong and weakly efficient levels, there are growing number of studies. These studies are called anomalies. Some of the major anomalies are,

1.   Weekend Effect

Stock returns do not have the same expected return for each day of the week. Typically Monday's return is slightly negative

2.   January Effect

Stock returns, especially those of small firms, are usually higher in January than in any other month.

3.   Low P/E Stocks

Stock with low P/E ratios outperform the market, after adjusting for risk, taxes and transaction costs.

4.   Small Firm Effect

Stocks of small firms have beaten the market on a risk-adjusted basis.

5.   Neglected Firm Effect

Firms which do not have a large following by analysis have abnormal returns associated with them.

6.   Unexpected Quarterly Earnings

Firms whose current quarterly earnings are well above their expected quarterly earnings tend to have positive abnormal returns for several weeks before and after the large increase in earnings becomes public information.

7.   Value Stocks

Stocks of small firms with high book to market ratios and high dividend yields have tended to out-perform the market on a risk-adjusted basis.

Effect (Criticism) of EMH on Technical and Fundamental Analysis

Technical Analysis, as an approach has been fairly useful in detecting trends and reversals of market movement, A majority of the mutual funds which entered when the market was ascending great heights are performing poorly even after five years thus, emphasizing the importance of the times as a factor

EMH is entirely in agreement with upward or downward change in trends since only the short run price changes are random and not the price trends themselves. While discussing semi-strong form of EMH we will see that the market does not always react to value relevant "information" in an 'accurate' manner

It is this inaccurate price adjustment, which increase the possibility of developing trading strategies which might work and so the desirability of fundamental analysis. The semi-strong form of random walk says that analysis who employ fundamental analysis should possess superior insight into company's future prospects using their own data rather

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than merely publicly available information and even inside information for consistently earning abnormal returns. This is indeed a tougher proposition to achieve but even on a simple plane, analysts who employ fundamental analysis have their worth proved as far as identifying securities in the risk-return framework is concerned. Even for a buy and hold strategy, no need to pick securities which are at least priced equal to (if not less than) their intrinsic value

Q31. What is efficient market hypothesis (EMH)? What are the common misconceptions about the efficient market theory and how would you dispel them?

Answer :   *May/June-13, Q2(b)*

Efficient Market Hypothesis (EMH)

For answer refer Unit I, Page No. 1.36, Q.No. 29, Topic: Efficient Market Hypothesis (EMH)

Misconceptions about EMH

Generally, efficient market hypothesis is misinterpreted. Some common misconceptions about EMH are identified with their solutions to dispel them. Such misconceptions along with their solutions are discussed below,

1.   Misconception

A common misconception about EMH is that it states market possesses excellent strength of forecasting.

Facts

However, in reality EMH implies that prices only keep the entire information which does not mean that the market possesses excellent strength of forecasting.

2.   Misconception

The fair value cannot be obtained as prices tend to fluctuate

Fact

The fluctuation in prices is essential to reflect the fair value of stock. There exist surprises under the market, since future is uncertain

3.   Misconception

The expected performance result of the investment portfolios may not be achieved if portfolios manager of an organization is incapable or incompetent.

Fact

Practically, it is difficult to achieve the superior performance in efficient markets even though the efficiency in market exists only when portfolio manager is able to perform his job properly in the competitive markets.

4.   Misconception

Stock market is irrational due to the presence of arbitrary fluctuations of stock prices.

Fact

Irrationality and randomness distinguishes from each other. The stock prices randomly change if the investors are found to be competitive and logical in nature

PROBLEMS

1.   The value of a portfolio at time t = 0 was 110 and at the end of the first year (t = 1) is ₹ 135 with total dividends of ₹ 15 on various securities constituting the portfolio. Calculate the rate of return on the portfolio.

Solution :

Given that,

$P_0 = ₹ 110$

$P_1 = ₹ 135$

$D = ₹ 15$

$r = \dfrac{(P_1 - P_0) + D}{P_0} \times 100$

$= \dfrac{(135 - 110) + 15}{1.0} \times 100 = \dfrac{25 + 15}{110} \times 100$

$= 36.36\%$

2.   The current price of the stock is ₹ 100. The stock does not pay any dividends, given below are the prices at which the stock might be sold after one year and their respective probabilities of occurrence.

End-of-year-price (₹)	Probability
90	0.10
95	0.20
100	0.40
110	0.20
115	0.10

Calculate,

(a)   The expected return

(b)   The standard deviation of the expected return

(c)   The semi-deviation of the expected return.

Solution :

Given that,

$P_0 = ₹ 100$

(a)   Calculation of Expected Returns

Return (r, %)	Probability (P_i)	P_i r_i
10	0.1	1.0
-5	0.2	-1.0
0	0.4	0.0
10	0.2	2.0
15	0.1	1.5
		$\Sigma P_i r_i = 1.5$

Expected return, $\bar{r}_i = \sum_{i=1}^{n} P_i r_i = 1.5\%$

(b)   Calculation of Standard Deviation

r_i	$r_i - \bar{r}_i$	$(r_i - \bar{r}_i)^2$	P_i	$P_i(r_i - \bar{r}_i)^2$
-10	-11.5	132.25	0.1	13.225
5	-6.5	42.25	0.2	8.450
0	-1.5	2.25	0.4	0.900
10	8.5	72.25	0.2	14.450
15	13.5	182.25	0.1	18.225
				55.250

Variance of returns $= \sum_{i=1}^{n} \left[P_i (r - \bar{r})^2 \right]$

$\sigma^2 = 55.250$

Standard deviation of returns,

$\sigma = \sqrt{55.250} = 7.43$

(c)   Calculation of Semi-variance

For calculation of semi-variance semi-deviation, we have to select only negative deviations from means.

Semi-variance $= 13.225 + 8.45 + 0.9 = 22.575$

$\rightarrow$ Semi-deviation $= \sqrt{22.575} = 4.75$

3.   The returns on securities A and B are given below,

Probability	Security A	Security B
0.5	4	0
0.4	2	3
0.1	0	3

Which security do you prefer on the basis of return and risk?

Solution :

(a) Calculation of Return and Risk of Security A

r_A	P_s	$r_A P_s$	$r_A - \bar{r}_A$	$(r_A - r_A)^2$	$P_s(r_A - r_A)^2$
4	0.5	2.0	1.2	1.44	0.720
2	0.4	0.8	0.8	0.64	0.256
0	0.1	0.0	2.8	7.84	0.784
		2.8			1.768

Return, $\bar{r}_A = \sum_{s=1}^{k} r_A P_s = 2.8$

Variance, $\sigma^2 = \sum [P_s (r_A - \bar{r}_A)^2] = 1.76$

Risk, $\sigma = \sqrt{1.76} = 1.33$

(b) Calculation of Return and Risk of Security B

r_B	P_s	$r_B P_s$	$r_B - \bar{r}_B$	$(r_B - \bar{r}_B)^2$	$P_s(r_B - \bar{r}_B)^2$
0	0.5	0.00	1.50	2.25	1.125
3	0.4	1.20	1.50	2.25	0.900
3	0.1	0.30	1.50	2.25	0.225
	1.5				2.25

Return, $\bar{r}_B = \Sigma r_B P_s = 1.5$

Variance, $\sigma^2 = \Sigma [P_s (r_B - \bar{r}_B)^2] = 2.25$

Risk, $\sigma = \sqrt{2.25} = 1.50$

Conclusion

Security A is preferable as its return is higher and risk is lower than security B.

1.9 BEHAVIOURAL FINANCE AND HEURISTIC DRIVEN BIASES

Q32. Define Behavioural Finance. How do you evaluate the behavioural critique?

Answer :   *Model Paper-III, Q6(b)*

Behavioural Finance

Some of the definitions of Behavioural Finance are as follows,

1   According to Sewell (2001) behavioural finance is defined as "the study of the influence of psychology on the behaviour of financial practitioners and the subsequent effect on markets".

2   According to Shefrin (1999), "behavioural finance is the application of psychology to financial behaviour – the behaviour of investment practitioners"

3   According to Lintner G. (1998) "behavioural finance is being a study of human interprets and acts on information to make informed investment decisions"

4. According to Olsen R. (1998) "behavioural finance seeks to understand and predict systematic financial market implications of psychological decision process"

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5 W Forbes (2009) defined "behavioural finance as a science regarding how psychology influences financial market. This view emphasizes that the individuals are affected by psychological factors like cognitive biases in their decision-making, rather than being rational and wealth maximizing"

Evaluation of Behavioural Critique

Efficient market hypothesis signifies that prices are appropriate/exact/right and it is very difficult to identify easier profit opportunities.

Behaviourists describes that the two implications namely correct prices and non profit opportunities is very critical sometimes, as the prices may not be right all the time even though, it does not provide profit opportunities easily

Hence, it is proved that inadequate profit opportunities does not mean that prices are right.

Investors are still worried about the existence of opportunities and are finding the ways for making money from mispricing.

Efficient market hypothesis has a significant implication that security prices acts as credible guide for allocation of real capital. When the prices are misrepresented then capital markets will provide misleading signals for allocating the resources in a effective manner In this situation, the behavioural assessment of the efficient market hypothesis is very important.

The strength of the behavioural critique has become a topic of debate for the financial economists. Most of those economists feel that the behavioural approach is not in an appropriate format and explains any inconsistency by integrating irrationalities which are selected from a laundry list of behavioural biases.

Basically, some economists are not accepting anomalies literature as it is an indication of efficient market hypothesis. Fama examined the anomalies literature and gives a challenge to the behavioural school. He discusses that the anomalies are not stable with respect to their support for one type of irrationality against the other For instance, several paper documents require long-term corrections whereas, several other documents requires long-term continuations of abnormal returns Minı errors too can result in abnormalities when employed to long-term returns while selecting a benchmark for making a comparison of returns. Thus, several results in these studies are too sensitive to minor or small benchmarking errors. Fama found that minor changes in methodology or technique will have a significant impact on conculsions.

Behavioural critique of full rationality in terms of investors decision-making process is well-understand but the degree to which the rationality is affected for pricing the assets is questionable It is still very early to judge which behavioural approach will 'stick' and becomes a part of standard toolkit of financial analysis.

Q33. Explain in detail about behavioural interpretation information processing.

Answer :

Information Processing

While processing the information error occurs, due to which the investors will not able to evaluate suitable probabilities for potential events or related or return. Many biases are listed or recorded in a file, out of which the following four are the major biases.

1. Forecasting errors

2. Overconfidence

3. Conservatism

4. Sample size neglect and representativeness.

1. Forecasting Errors

Kahneman and Tversky conducted sequential experiments and found that, individuals generally give more importance to recent experience instead of prior experiments while making forecasts and will make severe or intense forecasts (when the intrinsic uncertainty in their information is given). De Bondt and Thaler discussed about profit earning impact and stated that it can be interpreted by earnings expectations which is very severe If the companys forecasts about its future earnings is relatively high due to its positive performance then it may be too high in relation to the potential objectives of the company. This in turn leads to high initial P/E (Profit Earnings) and ineffective performance if the investors finds the error. As a result of this, high P/E companies gives poor investments.

2. Overconfidence

Individuals overestimates the accuray of their forecast as well as their abilities.

As per the famous survey conducted in Sweden it was found that, 90% of the drivers rank themselves as better than the average drivers

The other best example for overconfidence in financial markets gives by Barber and Odean is about the individuals who normally compares the trading activity and its returns with brokerage accounts of men and women. They found that men are more active when compared to women. They also found that high trading activity while forecasting involves poor investment performance. Top 20% of accounts which are ranked as per the portfolio turnover has average returns of percentage points which is less than the 20% of the accounts with less turnover rates. Finally, they comes to the conclusion by saying that "trading is hazardous to your wealth".

3. Conservatism

A conservatism bias signifies that the investors are too slow or more conventional to make any modifications in their beliefs or assumptions in, this indicates that the investors primary intention is to underreact the information of a company so that the prices shows the new information slowly. Hence, this bias results in momentum in stock market returns.

4. Sample Size Neglect and Representativeness

Usually, it is seen that most of the individuals ignores the sample size. They may use small sample to represent population instead of large sample size and prefers a pattern of small sample and extend it for any changes raised in the future.

It is easier to determine the way in which such a pattern is consistent with over reaction and correction anomalies. When investors earns good earnings or high returns on stock, they revises their estimations of future performance, for generating buying pressure which over estimates the price run-up. Finally, the market corrects its primary error, if the gap between price and intrinsic value becomes extreme.

Thus, it is proved that the stocks with best performance represents reversals accurately within few days and the investors found that their initial beliefs was very severe. By integrating the two biases i.e., conservatism and representativeness biases it is easier to attain a pattern of short-to-middle-term momentum with long-term reversals.

Q34. Discuss behavioural Biases. Explain limits to arbitrage.

Answer :

Behavioral Biases

Even though the information processing is accurate and appropriate, the individuals can take rational (not complete) decisions by using the information provided. This in turn influences the way in which the investors frame questions of risk versus returns and thus makes risk return trade-offs.

(i) Framing

The decisions are mostly influenced by the way in which the choices are framed. For instance, a study conducted by Kahneman and Tversky found that, an individual can reject a bet when it is described with respect to the risk surrounding the potential gains and can accept a bet when it is defined with respect to the risk surrounding the with possible losses.

In simple words, individuals mostly prefers risk-averse in terms of gains and seeks risk in terms of losses.

(ii) Mental Accounting

A mental accounting is a particular type of framing wherein the individuals exclude certain decisions.

According to Odean, the investors are interested in selling the stocks with gains/profits instead of losses which is exactly opposite to a tax minimization strategy.

For instance, an investor is ready to take huge risk with one investment account but creates other account with conservative status especially for her child's education. It is better for an investor to view these accounts as investor's entire portfolio with risk-return profiles combined in a single framework.

Statman protested that mental accounting is compatible with few investors irrational preference for stocks with greater cash dividends and has a tendency to manage the losing stock positions for longer period.

(iii) Regret Avoidance

According to psychologists, the individuals will blame themselves more, if the decisions taken by them turn out badly and are not conventional.

For instance, purchasing blue-chip portfolio which turns down is not as troublesome as experiencing the similar losses from an unknown start-up company as any losses on blue chip stocks can be stated easily as badluck or ineffective decisions making and causes less regret.

De Bondt and Thaler stated that any type of regret avoidance is compatible with both the size as well as with book-to-market effect.

Generally, higher book-to-market companies has less stock prices. They are 'out-of-favour' and is in a financially uncertain position. In the same way the smaller less-well known, companies are also less conventional investments. These firms/companies should have courageous investors for increasing the desired rate of returns.

Mental accounting can be added to this effect, when investors emphasize on the gains or losses of individual stocks instead of broad portfolios which becomes risk-averse relating to stocks due to recent poor performance and discounts their cash flows at a higher rate in order to produce "value stock risk premium".

Limits to Arbitrage

Behavioural advocates argues that practically many factors limits/restricts the ability to earn profit from mispricing. These factors are as follows,

(a) Fundamental risk

(b) Implementation costs

(c) Model risk

(a) Fundamental Risk

If Infosys' share value is underpriced then buying its shares may provide a profit opportunity. But it involves very high risk as the presumed market underpricing can get severe. This price should be converted to intrinsic value which will not occur till the completion of investor's investment horizon.

For instance, an investor who is a mutual fund manager looses his clients due to its poor performance in short-term or a trader have to run through his capital in investments when the market situation turns down temporarily. The risk involved in exploiting profit opportunity restricts the activity as well as efficiency of arbitrage traders

(b) Implementation Costs

It is very difficult to utilize overpricing short selling securities incurs costs and short sellers should return the securities borrowed on short notice. Therefore, short selling involves uncertainty and certain investors like pension or mutual fund managers are not permitted to sell short securities. This limits the ability of arbitrage activity and drives the prices to be at fair value.

The primary expectations of abnormal returns because of talented management can increase the above the net asset value. But the management feels that decrease in investors net returns can decrease price below the net asset value of the portfolio.

(c) Model Risk

Investors should always be concerned about making the profit opportunity more clear as making use of faulty model to value the security and price is appreciable. Further, this probability too makes the trading activity risky and restricts the degree to which it will be attained.

Q35. Define heuristic-driven biases. What are the types of heuristic-driven biases?

Answer :

Heuristic-driven Biases

Heuristic-driven biases are the type of bias which is commonly seen in the behavioural finance. Heuristic driven biases emerge due to the formulation of irrational assumptions and imperfect decision strategies that affects the decision making capacity of the investors, leading to the flaws in the judgement.

Behavioural finance proved that the financial decisions are mainly dependent on the psychology and emotions of the individuals. It argued that the heuristic driven biases and errors may lead to the creation of ambiguity between the market price and the fundamental value of the stocks.

Types of Heuristic-driven Biases

The major heuristic-driven biases and cognitive errors which impair judgement are as follows,

1. Representativeness

2. Overconfidence

3. Anchoring

4. Familiarity

5. Aversion to ambiguity

6. Innumeracy

1. Representativeness

The tendency to make judgments on the basis of termed stereotypes is termed as representativeness.

For instance, framing an opinion about a student's academic performance in the college based on his academic performance in school

Representativeness is considered as a good rule of thumb' but it can also take the people away from the correct course. For instance,

(a) Investors can quickly identify data patterns data which are in random.

(b) By seeing the efficient growth of earnings in the past, the investors assumes that it can act as a representative for high growth rate in the future. Further, investors are not aware of the existence of randomness in the earnings growth rates.

(c) Investors may be interested to invest in mutual funds as they feel that it has good track record and are well-performing funds. The investors may forget that unskilled managers can also get greater returns by luck

(d) Investors will become excessively optimistic about past winners and excessively pessimistic for past losers.

(e) Normally, investors feels that good firms holds good stocks which is not always true as, good companies can also hold bad stocks.

2.   Overconfidence

Sometimes, individuals acts in an overconfident manner and over estimates the preciseness of their forecasts, which are partially derived from illusion of knowledge'

Human mind has the ability to obtain more and more information from the information available but, may not have sufficient knowledge about the availability of adequate information for developing exact in uncertain conditions.

The other factor leading to overconfidence is illusion of control, wherein individuals assumes that they have an impact on future outcomes even in an uncertain situation

This may give rise to several factors such as active involvement and positive early outcomes. Active involvement deals with online investing and enables investors to have a sense of control. Positive early outcomes completely depends on luck and leads to illusion of control

Inspite of failures, many people remain over-confident. The reasons behind this can be,

(a)   They might remember their success and forget about their failures.

(b)   People define their success based on their skills and talents and failures may be due to bad luck

(c)   Harvard psychologist, Langer outlines this phenomenon as "head I win, tail its chance"

(d)   Human tendency mainly concentrates on future plans instead of past experience

3.   Anchoring

Once an opinion is framed/designed, people are reluctant to change it, though they receive significant information.

For instance, investors created an opinion about company X that it earns above average profits in long-term. But unfortunately, company X reports about its earnings which is lower than the expected/estimated earnings. Investors will continue with their assumption for company X and does not reacts to the bad news. Anchoring is also termed as conservatism. Thus, on the day of earnings announcement, the stock price will decrease to some extent. Though the price is shifted downwards, after sometime the investors drop out their initial conservatism

Anchoring represents itself in a phenomenon known as "post-earnings announced drift" which is well-stated based on the observations.

4.   Familiarity

Individuals feel pleasant and comfortable with the things which are familiar to them. The human minds usually opts for familiarity, shortcut while selecting investments. Familiarity generates multiples in investments so, people prefers to invest more and more in the stocks of either their employer's company, local companies and domestic companies.

5.   Aversion to Ambiguity

Mostly, the individuals are afraid of uncertain situations and feels that they have inadequate information about the potential outcomes. Increase of experiments, people tends to bet if they know the possibilities of different outcomes.

In the world of investments, the term aversion to ambiguity signifies that investors are more cautious about stocks. On the other side, it means investors preference is only for familiar things which is manifested in 'home country bias' (where investors prefers stock of their country only), 'local company bias' (where investor's preference for stocks is of their local area) and finally 'own company bias' (where employees of any particular company prefers stocks of their company itself).

6.   Innumeracy

Individuals normally faces difficulty with numericals. Difficulty with numericals can be seen in the following ways,

(a)   Individuals get confused between 'nominal' changes and 'real' changes, such a confusion is called as "money illusion" by economists. Nominal changes signifies greater or lesser numbers of actual rupees and real changes signifies big or small purchasing power

(b)   Individuals face difficulty in finding out 'time' probabilities in which 'odds' are kept differently and people does not have any idea about what the odds are

(c)   Individuals give greater emphasis on big numericals and lesser emphasis on small figures.

(d)   Individuals evaluates the chances of events based on the past examples instead of how frequently the events took place.

(e)   Individuals mostly neglects 'base rate' which denotes normal experience and prefers the 'case rate' which denotes the most recent experience.

SHORT QUESTIONS AND ANSWERS

Q1.   Real Assets Vs Financial Assets.

Answer :   *(Model Paper-I, Q1 | April-17, Q1(a) | May/June-16, Q1(a))*

Financial and real assets constitute the most important form of assets which can be differentiated on the following grounds,

	Criteria	Financial Assets	Real Assets
1	Nature	Financial assets are intangible in nature.	Real assets are tangible and are also called as physical assets.
2	Examples	Technical knowledge, trademarks, patents etc., are the examples of financial assets of a firm.	Machinery, building, inventory, computers etc., are the examples of real assets.
3	Objective	Financial assets do not contribute towards the accumulation of society's wealth.	Real assets heavily contributes towards the wealth of the society
4	Contribution to production system	Financial assets contribute indirectly towards production of goods and the delivery of services, as they helps in providing the financial assistance to the enterprises by guiding them to specifically undertake investment opportunities.	Real assets contribute directly to improve the production capacity of the firm to produce goods and services.
5	Function	Financial assets is concerned with the allocation of income or wealth among the investors, shareholders and other parties associated with the business.	Real assets is concerned with the production of goods and services.

Q2.   Sources of Risk

Answer :   *April-17, Q1(b)*

The various sources of risk are as follows,

1.   Interest Rate Risk

The changes that are brought in the returns of securities due to variability in the interest rates is called as interest rate risk. The interest rate risk is caused when the rate of interest goes up then it decreases the market value of investment. The interest rate risk is tolerated by the bank by choosing it, it is not being accepted as unexpected y.

An organization while offering financial services got ready to face risk, confirms that should manage it without difficulty instead of getting it converted into any other unwanted risk

2.   Market Risk

Firm faces market risk when values fluctuate due to market factors. Market factors include market interest rates, equity prices, foreign exchange rates and commodity prices. Usually, referred to as systematic risk, non diversifiable risk or beta risk

3.   Inflation Risk

This risk is linked with interest rate risk. An increase in inflation lead to an increased in interest rates. So, the inflation risk is caused when the changes in the economy is uncertain.

4.   Financial Risk

It arises when firms make use of debt financing as a source of finance. Financial risk involves the aspect of financial leverage. In financial risk, other things being constant, while purchasing assets if the amount borrowed is more then returns would tend to fluctuate more.

Q3.   Chartist Approach

Answer :   *May/June-16, Q1(b)*

Chartist approach is based on the forecast of past behaviour of stock exchange rate. One of the significant feature of chartist approach is that it changes with time. One of the drawback of this approach is that it cannot be tested with standard techniques. Later Markov has used the regime switching techniques and rewrite the chartist model to test the exchange rates behaviour of Canada.

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Q4. Investment Decision Process

Answer : *Dec.-15, Q1(a)*

The investment process involves a series of activities leading to the purchase of securities or other investment alternatives.

The investment process can be divided into five stages as,

1. Investment policy
2. Investment analysis
3. Investment valuation
4. Portfolio construction
5. Portfolio evaluation

Figure: Investment Process

Q5. Co-efficient of Variation

Answer : *(Model Paper-III, Q5 | Dec.-15, Q1(b))*

The Coefficient of Variation (COV) indicates direct correlation between a fund's return and risk features. The coefficient of variation is calculated by dividing standard deviation of funds by its return (arithmetic). It facilitates the analyst to normalize risk relative to return. When ratio is higher, the risk in proportion to return will be greater.

$$\text{Coefficient of Variation} = \frac{\text{Standard Deviation}}{\text{Return (Arithmetic)}}$$

Q6. Types of Risk

Answer : *(April/May-14, Q1(b), May/June-12, Q1(c))*

Total risk is the main component of investment decisions. It have been classified into two due to unsteadiness in returns. They are,

1. Systematic risk and
2. Unsystematic risk.
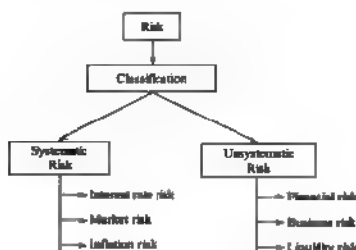
Figure

Q7. Parameters of Economic Analysis

Answer : *April/May-14, Q1(c)*

The level of economic activity has an impact on investment in many ways. If the economy grows rapidly, the industry can also be expected to show rapid growth and vice-versa.

When the level of economic activity is low, stock prices are low, and when the level of economic activity is high, stock prices are high reflecting the prosperous outlook for sales and profits of the firms. Therefore, the analysis of macro economic environment is essential to understand the behavior of the stock prices.

The commonly analyzed macro economic factors are as follows.

(i) Gross Domestic Product (GDP)
(ii) Savings and Investment
(iii) Inflation
(iv) Interest Rates
(v) Budget
(vi) Tax Structure
(vii) Balance of Payment
(viii) Monsoon and Agriculture
(ix) Infrastructure Facilities
(x) Demographic Factors.

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Q8. Investment Objectives

Answer : *May/June-13, Q1(a)*

There are five types of investment objectives which are based on different approaches. They are,

1. Speculation

Plans for a very short period. Holding period varies from few days to months. Willing to undertake high risk. Like to have returns for assuming high risk. Considers inside information, heresays and market behaviour. Uses borrowed funds to supplement his personal resources.

2. Aggressive Growth

Investor who is adopting the aggressive growth investment approach assumes high market risk for generating high returns. He mainly focuses on maximizing the capital appreciations rather than generating the current income.

3. Growth

In case of growth investment approach, investor also emphasizes on the generation of current income apart from achieving the high capital appreciation. Based on this approach, investor assumes high level of risk and expects more than average returns.

4. Growth and Income

Under this approach, investor emphasizes on the achievement of both higher returns from capital appreciation and current income by investing in portfolio. Some investments are more volatile than others, which may lead to substantial and rapid changes in either gains or losses in their value. In this category, investor accepts minimum risk and greater volatility when compared to the income objective of investment management.

5. Income

Investors expect income more than the average market return. Such returns are associated with high risks and are more volatile than the general market.

Q9. Ex-post Return Vs Ex-ante Return *(Model Paper-II, Q4 | May/June-13, Q1(b))*

OR

Ex-ante and Ex-post Returns *April-15, Q1(b)*

OR

What is Ex-ante and Ex-post returns?

Answer : *Dec.-13, Q1(b)*

Ex-post Returns

Ex-post returns refer to the actual returns obtained from the investments. They properly measure the returns generated by an investment, one must consider both the price change and cash flow derived from the investment during the period it was held.

The measurement of returns from the historical data can be referred to ex-post returns. This includes both current income and capital gains (or losses) brought about by the appreciation (or depreciation) of the price of the security. The income and capital gains price of the security. The income and capital gains are then expressed as a percentage of the initial investment.

Ex-ante Returns

The majority of investors tends to emphasize the returns they expect from a security while making investment decision and the expected return of a security. This enables investor to look into future prospects from an investment and the measurement of return from expectations of benefits is known as ex-ante returns.

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Q10. What is technical analysis?

Answer :

Technical analysis studies the characteristics which may be expected at major market turning points and their objective assessment. It provides information about future stock price movements by taking historical price movements of shares into its consideration.

The rational behind technical analysis is that share price behaviour repeats itself overtime and the analyst attempts to drive methods to predict this repetition so that buying and selling decisions of shares can be made.

The technical analyst believes that share prices are determined by the demand and supply forces operating in the market. These demand and supply forces in turns are influenced by a number of fundamental factors as well as psychological or emotional factors. Many of these factors cannot be quantified.

The combined impact of all these factors is reflected in the share price movements. Technical analyst have developed tools and techniques to study past patterns and predict future price

Q11. Standard Deviation

Answer :

Standard deviation (commonly denoted as σ) of returns measures the extent of deviation of returns from the average value of return. Precisely, standard deviation of return is the square root of the average of squares of deviation of the observed returns from their expected value of returns.

The square of standard deviation is called as variance and commonly denoted as σ^2. The variance is computed as follows,

$$\text{Variance, } \sigma^2 = P_1 (r_1 - \bar{r})^2 + P_2 (r_2 - \bar{r})^2 + \ldots \ldots + P_n (r_n - \bar{r})^n$$

$$\text{And } \sigma = \sqrt{\text{Variance}}$$

Q12. Fundamental Analysis

Answer :

Fundamental analysis is an approach to determine 'what ought to be price' otherwise known as "intrinsic" or "true" value of a security.

Fundamental analysis is based on the premise that a security has an intrinsic value at any given time. The intrinsic value of a security depends on a multitude of factors like the earnings of a company, the growth rate, its products, its management, the risk exposure, the economic and industrial environment in which the company is operating. By assuming these fundamental determinants governing performance of the company, it is possible to determine an estimate of its intrinsic value.

The proper order in which to proceed in fundamental analysis is, first to analyze the overall economy and security markets. Second, analyze the industry within which a particular company, operates. Finally, the analysis of the company should be considered.

EXERCISE PROBLEMS

1   Following data give the market return and the Sun company scrips return for a particular period.

Index return (r_m)	0.5	0.6	0.5	0.6	0.8	0.5	0.8	0.4	0.7
Script return (r)	0.3	0.6	0.4	0.5	0.6	0.3	0.7	0.5	0.6

What are the beta values of the Sun company scrip?

(Ans: $\beta = 0.75$).

2.   Stocks L and M have yielded the following returns for the past two years.

	Return (%)	
Years	L	M
1995	12	14
1996	18	12

(a)   What is the expected return on portfolio made upto 60% of L and 40% of M?

(b)   Find out the standard deviation of each stock.

(c)   What is the covariance and coefficient of correlation between stock L and M?

(d)   What is the portfolio risk?

(Ans: (a) = 14.2%

(b) = 1

(c) = (– 3), (– 1)

(d) = 1.4).

3.   A portfolio consists of securities X, Y and Z. The following information is available.

Return (%):

$r_x = 15$, $r_y = 17$, $r_z = 20$

Risk (%):

$\sigma_x = 18$, $\sigma_y = 20$, $\sigma_z = 25$

Correlations.

$\rho_{xy} = 0.5$, $\rho_{yz} = 0.2$, $\rho_{xz} = -0.5$

Investment proportion: EQUAL

Calculate portfolio return and risk.

(Ans: Portfolio Return = 17.34%

Portfolio Risk = 12.60%).

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4.   Mr. X has a portfolio of four common stocks with the following market values and returns.

Stock	Market values (₹)	Returns (%)
P	10,000	10
Q	20,000	14
R	30,000	16
S	40,000	15
	1,00,000	

Calculate return of the portfolio.

(Ans: 14.50%).

5.   Calculate β of the security J given the following data.

Year	k_j	k_m	P
1	20	10	0.10
2	50	30	0.10
3	-50	-30	0.10
4	10	-10	0.10
5	90	10	0.10
6	20	10	0.10
7	-10	10	0.10
8	20	10	0.10
9	20	-10	0.10
10	50	30	0.10

What is the significance of β value.

(Ans: β = 1.31).

INTERNAL ASSESSMENT

I. Multiple Choice

1. After formulating the investment policy, securities are scrutinized through, [ ]

   (a) Market analysis

   (b) Industry analysis

   (c) Company analysis

   (d) All the above

2. CIMM is a database introduced by the well-known research organization stands for, [ ]

   (a) Center for monitoring the indian economy

   (b) Center for foreign economy

   (c) Center for globalizing

   (d) Center for privatizing

3. Taking high risks not only for high return but also for thrill and excitement is, [ ]

   (a) Investment

   (b) Gambling

   (c) Speculation

   (d) None of the above

4. The approach which completely depends on emotions or mood of the investor rather than the reason behind investment in stock is, [ ]

   (a) Fundamental approach

   (b) Eclectic approach

   (c) Psychological approach

   (d) Academic approach

5. The changes that are brought in the returns of securities due to variability in the interest rates is, [ ]

   (a) Interest rate risk

   (b) Market risk

   (c) Inflation risk

   (d) Business risk

6. Systematic risk is also referred as, [ ]

   (a) Market risk

   (b) Non-diversifiable

   (c) Both (a) and (b)

   (d) Specific risk

7   An extra return over the risk free rate expected by investors to repay them for holding an asset with a certain
      degree of changes is,   [ ]

    (a) Risk aversion

    (b) Risk premium

    (c) Risk return trade off

    (d) None of the above

8.   The industries which are more volatile and do well when economy prospers and during depression they suffer
      a setback are considered as,   [ ]

    (a) Growth

    (b) Cyclical

    (c) Defensive

    (d) Vertical

9.   Which form of EMH is also known as randoms walk model?   [ ]

    (a) Weak form

    (b) Semistrong form

    (c) Strong form

    (d) Hard form

10. Anomalies of efficient market hypothesis are,   [ ]

    (a) Weekend effect

    (b) January effect

    (c) Small firm effect

    (d) All the above

II. Fill in the Blanks

1.   The process of sacrificing something in present for the prospects of gaining something in future is _____

2.   _____ is a package which is designed and marketed by capital market and is a well known organization in
      the field of finance.

3.   The measurement of returns from the historical data are refered as _____ .

4.   When business operates internationally, then the currency value which tends to change in the foreign exchange
      is known as _____

5.   _____ is a technique in which the investor choose one project which is less risker from the other investment
      projects.

6.   In the market, underpriced and overpriced securities are identified for making investment decisions through
      _____

7.   _____ is used for identifying trends in the stock market.

8.   _____ means taking up the business risk with an aim of getting short-term gain.

9.   _____ holds that the financial market is in possession of all available information influencing the price of a
      share or financial security which leads to perfect competition in market.

10. A empirical study of prices of an asset before and after some events like merger etc., is referred as

KEY

I.   Multiple Choice

1   (d)

2   (a)

3   (b)

4.   (c)

5   (a)

6.   (c)

7   (b)

8.   (b)

9   (a)

10   (d)

II.   Fill in the Blanks

1   Investment

2   Clne-ole

3   Ex-post returns

4.   Exchange rate risk

5   Risk aversion

6.   Fundamental analysis

7   Dow theory

8.   Speculation

9.   Efficient market hypothesis

10   Event study

III.   Very Short Questions and Answers

Q1.   What is Financial Asset?

Answer :

Investment made with an objective to derive future income in the form of interest, dividend, premiums, pension benefits or appreciation in the value of their capital purchasing of shares, debentures, post office savings certificates, insurance policies are all investments in the financial sense such investments generate financial assets

Q2.   Define Dow Theory.

Answer :

The Dow Theory, originally propounded by Charles Dow in 1900, is one of the oldest methods of identifying trends in the stock market This theory seeks to study the major movements in the market with a view to establish trends. Until a reversal occurs, a trend is assumed to exist It should be noted that the Dow Theory only describes the direction of market trends and does not attempt to forecast future movements or estimate either the duration or the size of such market trends.

Q3.   What is Systematic Risk?

Answer :

The variability in returns caused by factors external to the particular company and uncontrollable by the company is known as systematic risk It affects the market as a whole and cannot be entirely avoided by the investor The systematic risk is further sub-divided into market risk, interest rate risk and purchasing power risk

Q4.   What is Un-systematic Risk?

Answer :

The risk or variability in the profits of a firm is caused by various factors. Diversifiable risk is the extent of variability in the securities return on account of the firm specific risk factors. It stems from managerial inefficiency, technological change in the production process, labour problems etc , the nature and magnitude of those factors differ from one company to another

Q5.   What do you mean by Abnormal Return?

Answer :

The benefit generated from an investment can be termed as return, which includes both current income and capital gain caused by the appreciation of the price. It may be normal or abnormal. The return earned on a financial asset in excess of that required to compensate for the risk of the asset is called as abnormal return.

Q6.   Write about Single and Multi-period Returns.

Answer :

Single Period Returns

It refers to a situation where an investor is concerned with return from a single period (say, one day, one week, one month or one year etc.

Multi-period Returns

It refers to a situation when more than a single period returns are under consideration Investor is concerned with computing the return per period, over a longer period

UNIT — 2

Fixed Income Securities - Analysis, Valuation and Management

LEARNING OBJECTIVES

After studying this unit, one would be able to understand,

❖ The Concept of Fixed Income Securities and its Types.

❖ The Features and Types of Debt Instruments.

❖ Bond Indenture, Bond Yield Measurement and Bond Valuation Methods.

❖ The Concept of Bond Duration and Bond Convexity.

❖ The Factors which are used in Managing the Bond Portfolio.

❖ Bond Immunization and Bond Portfolio Management Strategies.

INTRODUCTION

Equity shares, bonds, debentures or any other marketable instruments are popularly termed as securities. There are various sources by which corporate raises their funds from public.

The recipient of money in a financial investment issues a document or a piece of paper to the investor (supplier of money), evidencing the liability of the former to the latter to provide return. This document also outlines the rights of the investor to certain prospects and/or property and sets the condition under which the investor can exercise his/her rights. In other way, this document is called as the "security certificate". The term "security" is a generic term used to refer those documents evidencing liabilities that are negotiable (transferable) that can be bought and sold in the stock market.

There are different types of securities conferring different sets of rights on the investors and different sets of conditions under which these rights can be exercised. Broadly speaking, investment avenues can be categorized on the basis of income generation ability are as follows.

Investment avenues can be evaluated on the basis of attributes like returns risk, marketability, tax shelter, safety and convenience. Therefore, determination of future dividend or earning flows, forecast of the stock price in future and estimating the intrinsic value of a security is termed as security analysis. There are three important functions of security analysis and are categorized as descriptive, valuation and critical. Descriptive analysis and Marshals analysis interprets the important facts relating to an issue and presents this information in a coherent, readily intelligible manner. This analysis requires a thorough probing of companies to understand the cases of past and present profitability and to intercept their relationship to future profitability. The second function of security analysis is to develop value estimates for stocks and bonds. The critical function of a security analysis is concerned with these practices and policies of the corporates that effect the investor.

2.1 FIXED INCOME SECURITIES

Q1. What are fixed income securities? What are the different types of fixed income securities in India?

Answer :   *Model Paper-I, Q7(a)*

Fixed Income Securities

It refers to securities such as debentures, saving certificates, bonds etc., which earns interest or dividend at fixed rate for a stipulated period of time, usually the life of a 12% bond of ₹1000 means that the issue has to pay the bond holder ₹120 per year for the use of money.

Types of Fixed Income Securities

The different type of fixed income securities that are available in India are as follows,

1. Bank Deposits

Deposits with banks are the safest mode of investment and earns a fixed rate of interest. Fixed deposits up to ₹1 lakh, in individual accounts covered by deposits insurance scheme.

They are highly liquid as fixed deposit receipts can be encashed premature at a discount of .% on interest. They are neither tradable nor transferable. Nomination facility is available.

2. Company Deposits

These deposits are with manufacturing and non-banking financial companies and earns a fixed rate of interest usually higher than bank fixed deposits rate.

These deposits are neither secured nor guaranteed by RBI and noted for untimely payment of principal amount. They are not exactly liquid. These are neither tradeable nor transferable. They are without nomination facility.

3. Small Saving Schemes

These are the safest means of investment and initial investment gets doubled in 5-6 years time. In the section 88, they are not tradeable and most instruments are accepted by banks as collateral.

4. Debentures and Bonds

These are long term debt instruments usually yield high rate of interest. The safety factor with these investments can be analyzed by considering credit ratings. They are freely tradeable and transferable, and hence provides for liquidity. Fixed income securities provide investors with two kinds of income. They are,

(i)   Current income (periodical receipt of interest or dividend)

(ii) Capital gains.

Debt instruments are the cherished conduit for investors money. An assured return and high interest rate are responsible for preference of bonds over equities. The year 1996-1997 witnessed their trading in the debt market, as resource mobilization reached a record level of almost ₹25000 crores, which s much above the equity segment.

The funds mobilized by ICICI and IDBI through debt issues accounted for high percentage of funds mopped in primary market. Financial institutions, banks and corporate bonds are offering attractive bonds like deep discount bond, education bonds, flexi-bonds etc.

Advantages of Fixed Income Securities

(i)   High yields, if the interest/dividend rates are good.

(ii)   Minimum risk exposure.

(iii) Opportunity for capital gains, if they are traded.

(iv)   Tax advantages.

Disadvantages of Fixed Income Securities

A major disadvantage of investing in fixed income securities is that the interest rate or dividend rate is fixed for the life of the issue and therefore cannot move up overtime in response to inflation. Lack of depth in the secondary market for fixed income securities often tends to restrict liquidity and reduce the opportunities for active portfolio management.

2.2 FEATURES AND TYPES OF DEBT INSTRUMENTS

Q2. What is a debt instrument? Explain various types of debt instruments.

Answer :

Debt Instrument

Debt instrument is legal obligation that enables the issuing party to raise funds by promising to repay a lender in accordance with the terms of a contract. Debt instruments are a way for the parties to easily transfer the ownership of debt obligation from one party to the another. Debt instrument acts as a medium to facilitate debt trading in which the debt obligation can move from one party to another party quickly and efficiently.

Debt instrument provides fixed return (i.e., coupon rate). The debt market is dominated by Government securities. Government securities (G-secs) is the largest element of the Indian debt market in terms of market capitalization, trading volumes and outstanding securities. For an investor G-secs are one of the best investment options.

Types of Debt Instruments

The various type of debt instruments are as follows,

1. Bonds
2. Debentures
3. Commercial papers
4. Certificate of deposit
5. Government securities
6. Amortized loans
7. Installment loans
8. Interest only debt
9. Mortgages
10. Letter of credit (L/C)
11. Callable debt
12. Convertible debt
13. Industrial revenue bonds.

1. Bonds

A bond is a marketable, legal contract that promises to pay who ever owns it at a predetermined rate of interest for a defined period and then repay the principal at the specific date of maturity.

2. Debentures

Debenture is a document which either creates a debt or acknowledges it and any document which fulfills either of these conditions is a debenture. The debenture is issued by the company and is in the form of a certificate of indebtness. I usually specifies the date of redemption. It also provides for the repayment of principal and interest at specified date of the given dates. It generally creates a change in the undertaking or undertakings of the company.

3. Commercial Papers (CPs)

It is a short term instrument of raising funds by corporate. It is a sort of unsecured promissory note sold by the issuer to the investor. The maturity of the commercial papers is flexible. Usually, borrowers and lenders adopt the maturity of commercial papers rated needs. Highly rated corporate which can obtain funds at a cost lesser than the cost of borrowing from banks are particularly interested in issuing CPs.

4. Certificate of Deposit

A certificate of deposit is a certificate that is issued by a bank to depositions of funds that remain at the bank as deposits but are negotiable and tradable in the short term money market.

5. Government Securities (G-secs)

The G-secs market is the oldest and largest component of the Indian debt market in terms of market capitalization, trading volumes and outstanding securities. The G-secs market plays a crucial role in the Indian economy as it provides the benchmark for determining the level of interest rates through the yields on the government securities which are traded as the risk free rate of return in any economy.

6. Amortized Loans

An amortized loan is one, which has regular periodic payments. Usually monthly periodic payments are done, but can be weekly, bi-weekly, quarterly also. The payment includes both principal and interest amount and equal repayments are made throughout the life of the debt such as installment loans.

7. Installment Loans

It is a consumer or business loan in which principal and interest are repaid in equal installments at fixed intervals. These loans are commonly secured by the item purchased or by the personal property of the borrower.

8. Interest only Debt

Interest only mortgages are a method of monthly payments that consists of paying only interest for a period of 5-10 years. The principal is not paid down unless the borrower wishes to pay additional.

9. Mortgages

A mortgage is a loan to purchase a property. A mortgage loan uses the property as collateral to guarantee repayment of the loan. The borrower gives the lender a lien against the property and the lender can preclose on the property of the borrower does not repay the loan as per the agreed terms.

10. Letter of Credit (L/C)

A letter of credit is defined as "an arrangement by means of which a bank acting at the request of a customer, undertakes to pay to a third party a predetermined amount by a given date, according to agreed stipulations and against presentation of stipulated documents". A letter of credit is an instrument signed by the importer's banker, wherein it promises the exporter to make payments if he abides by the conditions mentioned in the letter of credit and if the specifications of the exportally with those mentioned in the L/C. It is a letter of promise not a letter of guarantee.

11. Callable Debt

Debt that can be redeemed or paid off, prior to maturity at the option of the issuer under certain conditions.

12. Convertible Debt

Debt that can be exchanged for C/S at the option of the holder or the issuer, depending on terms.

13. Industrial Revenue Bonds

Bonds that are typically finance construction of manufacturing a commercial facilities for private use

Q3. State the features of debt instruments.

Answer :

Capital market consists of two types of securities which are being made available to an investor. The two types of securities are,

    1.   Fixed income securities and

    2.   Equity shares.

Fixed income securities includes the bonds and debentures or debt instruments and preference share

Bonds and Debentures or Debt Instruments

Debt instruments are the primary fixed income security which are issued by the borrowing company under the borrowing agreement. In this borrowing agreement the borrower/issuer promises the registered holder or debenture holder that the particular payment of interest would be made on specified dates and payback. The principal amount or debt at the maturity of a specified period. The payment of debt is made according to the terms and conditions of the agreement and payment amount might be equal to more than or less than the face value of the bond.

Under fixed income securities, amount of cash flow and time limits are fixed and predetermined in nature. Debt instruments are issued by taking into account the need and cash flow profile of the borrowing company and investors. Companies issue various types of debt instruments in practice. All these types of instruments does not possess the features of loan

Basic Features of Debt Instruments

Some of the basic characteristic features of a debt instruments are as follows,

(i) Interest Rates or Coupon Rates

Interest rate or rate of interest is also known as 'coupon rate'. Usually, debt instruments consists of a promise made by a borrower to pay a certain amount of interest at periodic intervals to the registered holder. In certain cases the borrower does not make any promise to pay interest to the registered holder or debenture holder. Debt instruments without any promise to pay interest are called as "zero coupon bonds"

(ii) Maturity Date

Each and every debt instrument holds the maturity date. The debt amount is repaid on maturity date.

(iii) Face Value and Redemption Value

All the debt instruments holds both the face value and the maturity value. Usually, the maturity value is equal to the face value. But in certain cases the maturity value might not be equal to the face value, while in few other cases the bond securities are repaid by converting them into equity shares.

(iv) Credit Instrument

Debt instrument is a kind of a loan. In case of debt instruments, debenture holder is a creditor and the borrowing company is a debtor. Borrowing company is liable to pay interest amount and the principal amount to the debenture holder. Apart from receiving the interest amount and principal amount, the debenture holder also enjoys some more rights.

(v) Collateral

Debt issued might be either secured or unsecured one s, so debentures or other similar kind of securities issued might be termed as 'secured debentures' or 'unsecured debentures'

(vi) Significance in Case of Windingup of a Company

In case of winding up of a borrowing company without the payment of debt. The court will settle the claim of debenture holder first when compared the claim of debenture holder first when compared to that of shareholder and other unsecured creditors. In other words, greater emphasis would be given to the debenture holder's claim than the shareholders and other unsecured creditors

(vii) Right to Vote

Debenture holders cannot exercise the right to vote under normal situations because they are the creditors of the company

2.2.1 Factors Influencing the Value of Debt Instruments

Q4. What are the factors that influences the value of debt instruments?

Answer :

Debt Instrument

Debt instruments are obligations of issuer of certain future cash flows of interest and principal, which the issuer would pay to the legal owner of the instrument. They can also be said to be tradeable type of loans.

Before investing in debt instrument some key considerations are to be kept in mind like maturity, redemption features, credit quality interest rate, price and yield as these factors help to determine the value of debt instrument and the degree to which it matches the financial objectives.

Factors of Debt Instruments

1.   Maturity

A debt instrument maturity refers to a specific future date on which the investors principal will be repaid. Maturities generally range from one day to 25 years. Maturity ranges are,

- Short term notes – Upto 4 years
- Medium term notes/bonds – Five to twelve years
- Long term bonds – 12 or more years.

2.   Redemption Features

The issuer usually exercises this option when the interest rates have dropped from the time the debt instruments have issued. Some have call option attached to them wherein the issuer can redeem them at any time prior to maturity.

3.   Credit Quality

Debt instrument choices range from the higher credit quality, which are backed by the full faith and credit of the government, to those that are below investment grade and considered speculative. As a debt instrument cannot be redeemed, or reach maturity for years even decades, credit quality is a crucial element when considering a fixed income investment.

4.   Interest Rate

Bonds pay interest that can be fixed, floating or payable at maturity. Most debt securities carry an interest rate that stays fixed until maturity and is based on the principal amount which is usually expressed as a percentage.

5.   Price

The price paid for a debt instrument is based on these variables, interest rates, supply and demand, credit quality, maturity and tax status. Newly issued debt instruments normally sell at or close to their face value. The debt instruments which are traded in the secondary market, fluctuate in price in response to changing interest rates.

6.   Yield

Yield is the return actually earned on the debt instrument based on the price paid and the interest payment received. There are two types of yields

(i)   Current yield

(ii) Yield to maturity.

(i)   Current Yield

It is the annual return on the rupee amount paid for the instrument and got by dividing the instrument's interest payment by its purchase price.

(ii) Yield to Maturity

The yield to maturity and yield to call are used crucially, it states the total returns that will be received by holding the debt instrument. It enables to compare debt instruments with different maturities and coupons. Yield to call is calculated in the same way as it is calculated for yield to maturity.

7.   Tax Status

Some debt instruments offer special tax advantages. There is income tax levied on the interest received on such instruments.

2.3 BOND INDENTURE

Q5. Write about,

(a)   Bond Indenture

(b)   Trustee.

Answer :

(a)   Bond Indenture

Bond indenture is a contract between bondholders and bond issuers by specifying certain rights and regulations to both the parties. These rights and regulations are associated with dividend policies, payment of interest rates in time, issue of bonds, limits to further borrowing, securities available to bondholders, liquidation of the company etc. Bond indenture consists of three parties, namely, bondholders, borrowing company and debenture trustees

(b)   Trustee

A trustee is a third party such as bank which is independent and act as a representative of bond holders. It is accountable for managing the contractual obligation of the bond issuers. If the person disobey the rules, then trustee being a representative of the bondholders possess a right to take legal action against the issued corporation.

2.3.1 Difference between Bearer Bonds and Registered Bonds

Q6. Differentiate between bearer bonds and registered bonds.

Answer :

The differences between bearer bonds and registered bond is shown below,

	Bearer Bonds		Registered Bonds
1	Bonds which are not registered are termed as bearer bonds and bearer is liable to receive these bonds.	1	Bonds which are registered with the bond trustee are termed as registered bonds.
2	Companies do not maintain any records, so they are not aware of the persons who purchased their bonds.	2	Companies maintain records of owners names, bond serial numbers and all the details
3	Bondholders are accountable for demanding interest payments, maintaining the securities safely and requesting loan principal	3	Companies themselves transfer the details of principle amount, interest payments to the registered bondholders.
4.	There exists a lot of communication gap and hence valuable information cannot be transferred from one person to another	4.	Information can be transferred freely as it possesses good rapport.
5.	As it lacks the details of the investors, it becomes difficult for the tax collectors to evaluate the tax on income	5	It is very easy for the tax collectors to determine tax on income as complete details are available

Q7. List out the differences between bonds and debentures.

Answer :

The differences between bonds and debentures is shown below,

	Basis	Bonds	Debentures
1.	Nature	Bonds can be either secured or unsecured.	Debentures are only unsecured.
2	Safety	Rank higher than debentures particularly government bonds. With credit rating PSU bonds too would be safe	Not protected by a specific bin or mortgage on the property of the company and hence less secure.
3	Liquidity	Can be encashed after initial lock in period. No facility for nom nation or bank loan except in specific cases. Weak secondary market.	Freely tradeable and transferable. Restricted liquidity due to lack of depth in secondary market. No facility of premature encashment. No nomination facility. Banks do not accept these as collateral against loans.
4	Yield	High yield ranging from 9% to 12%.	Highest ranging from 10% to 14%. Interest usually paid half-yearly

Q8. Explain the significance of bond portfolio management and state various types of bonds.

Answer : *April-15, Q3(a)*

Significance of Bond Portfolio Management

The process of managing the investments of any company or individual who invested their capitals in the form of bonds, shares, mutual funds etc., to earn the maximum profit within the available time period is referred as portfolio management process.

A bond is considered as one of the low risk investments compared to other investments in portfolio management. In simple terms, bond can be defined as a marketable legal contract that promises to pay whoever owns it a predetermined rate of interest for a defined period and then repay the principal at the specific date of maturity.

The significance of bond portfolio management can be understood by analyzing the importance of bonds. Some of the important points are discussed below to highlight the importance of managing bond portfolios.

1. Bond portfolio investment is less risky and provides average returns to the investors which are less than stock returns.
2. Bond investments served as anchor at the times of adversity winds.
3. Bonds are helpful for those investors who are not interested in keeping stock for a longer time.
4. Trading of bonds could be very useful for the investors when it is combined with stock trading in a portfolio.
5. Bonds investments provide higher level of certainty in the income of investors.

Types of Bonds

Types of bonds available are as follows,

1. Zero Coupon Bonds

Zero coupon bonds are also known as zero-interest fully convertible debentures. It is converted into equity shares at the expiry of the prescribed date. They are issued without coupon payments.

2. Callable and Putable Bonds

The borrower can retire or redeem the bond after the end of the initial specified period. This type of bond is known as callable bond. The holders are left with no option but to accept the redemption value, when borrower wishes to redeem the debt.

Putable Bond

Putable bonds are those which can be redeemed after the end of the initial specified period by lender. The holder has the option to redeem the bond when coupon rate becomes less than market interest rate.

3. Floating Rate Bonds

The bonds which do not have a fixed interest rate (coupon rate) are floating rate bonds. The interest rate of such bonds is related to the market rate known as benchmark.

4. Junk Bonds

Junk bonds are very risky in nature. The interest rate is high on these bonds. Interest risk and principal risk is also high in junk bonds. It is suitable for speculators.

5. Deep Discount Bonds

It is a kind of zero interest bond. Both coupon rate and interest is not paid on these bonds. They are non-convertible bonds which have a face value and issue price of these bonds is discounted value.

6. Municipal Bonds

The debt securities offered by the municipal authority in a particular city are called as municipal bonds. These bonds are used for the development of the city's infrastructure through raising funds. It is mainly issued to retail or institutional investors.

7. Inverse Floaters

Inverse floaters are same as floating rate bonds. The coupon rate is fixed in case of inverse floaters. When the market rate increases, the coupon rate decreases, that means there is inverse relationship between them.

8. Indexed Bonds

When coupon and maturity payments are linked to the general price index, then such type of bonds are known as indexed bonds. The coupon rate of such bonds are risk free interest rate or inflation free interest rate.

9. Perpetual Bonds

The bonds which cannot be redeemed are called as perpetual bonds. When a bond is considered as loan, it should be redeemed.

2.4 BOND YIELD AND FACTORS AFFECTING IT

Q9. What is bond yield? What are the various factors affecting bond yield?

Answer :

Bond Yield

An investor would earn returns if a bond was purchased and held to maturity. Usually, the longer the term of a bond, the higher the interest rate that is paid to the holder, compensating for the inflation risk of having money held up for a long time. To determine the yield, divide the interest rate by the purchase price of the bond. The percentage return that the investor will receive is bond yield.

The yield from a bond is made up of three components. They are,

1. Coupon interest
2. Capital gain
3. Interest on maturity.

Bond Yield Components

In principle, bond yield can be divided into two components one is the long term real interest rate, which consists of an expected future real interest rate, plus a risk premium to cover the uncertainties of its future changes. The other is inflation component, which depends on the expected futures inflation. Changes in long term bond yields should reflect variations in long term real interest rates, long run inflation expectations of risk premiums.

Factors Affecting Bond Yield

Base interest rate   Benchmark interest rate

Risk premium   Spread

Expected liquidity

Market forces – Demand and supply

2.4.1 Bond Yield Measurement: Current Yield, Holding Period Return, YTM, AYTM and YTC

Q10. What are the different ways in which the return on coupon bond can be calculated? Illustrate with suitable examples.

Answer :

Bond Return

The investor in bond typically receives income from the following,

(i) Interest payment at a contracted rate i.e., coupon rate

(ii) Capital gain or loss arising out of sale of the bond

(iii) Cash realization on the sale of bond

(iv) Redemption of the bond by the issue at a contracted value

The return on bond can be measured in terms of,

(a) Holding period return

(b) Current yield

(c) Yield to maturity

(d) Approximate yield to maturity

(e) Yield to call.

(a) Holding Period Return

An investor buys a bond and sells it after holding for a period. The rate of return in that holding period is calculated as follows,

Holding period return,

$$= \frac{\text{Price change} + \text{Coupon interest (if any)}}{\text{Price at the beginning of the holding period}}$$

The holding period rate of return is also called as the one period rate of return. The holding period return can be calculated daily or monthly or annually. If the fall in the bond is greater than the coupon payments, then the holding period return will turn to negative.

Examples

1. An investor 'A' purchased a bond at a price of ₹ 900 and earned ₹ 100 as coupon before selling it at ₹ 1000. What is his holding period return?

Solution :

Holding period return,

Price change $= (P_1 - P_0)$

$$= \frac{\text{Price change} + \text{Coupon payment}}{\text{Purchase price}}$$

$$= \frac{(1000 - 900) + 100}{900}$$

$$= \frac{100 + 100}{900} = \frac{200}{900} = 0.222$$

$$= 22.22\%$$

2. If the bond is sold for ₹ 750 after receiving ₹ 100 as coupon payment and purchased for ₹ 900, what is the return on bond?

Solution :

P_1 P_0 $= 750$ $900 =$ 150

Return on bond $= \dfrac{-150 + 100}{900}$

$$= \frac{-50}{900} = 0.0556$$

$$= 5.56\%$$

(b) Current Yield

The current yield is an annual cash flow measure of return based on current market price.

It is the coupon payment as a percentage of current market price and is computed as follows,

$$\text{Current yield} = \frac{\text{Annual coupon payment}}{\text{Current market price}}$$

With this measure, the investor can find out the rate of cash flow from the investments every year. The current yield differs from the coupon rate, which is also called as nominal yield.

Example

Determine nominal yield and current yield of ₹100 bond with a market value of ₹80 and coupon rate of 8%.

Solution :

Face value of a bond, $P_{bc} = ₹100$

Market value of a bond, $P_0 = ₹80$

Coupon rate, $r = 8\%$

Coupon amount, $C = 8\%$ of $100 = ₹8$

Nominal yield = Coupon rate = 8%

$$\text{Current yield} = \frac{C}{P_0} = \frac{8}{80} = 0.10 = 10\%$$

(c) Yield to Maturity (YTM)

The concept of Yield to Maturity (YTM) is one of the widely used tools in bond investment management. The current way of computing the return on any asset involves considering the entire sequence of cash flows with their timing and calculating the internal rate of return.

In case of a bond, there is a cash outflow (equal to the price of the bond) when the bond is bought but there are cash inflows, when the periodic interest coupons are received, another cash inflow is the redemption value is received on maturity.

Calculating the IRR of these streams of cash flows gives the true return on the bond which is known as the Yield to Maturity (YTM).

Therefore, YTM is the single discount factor that makes present value of future cash flows from bond equal to the current price of the bond. To find out the yield to maturity, present value technique is adopted. The formula is,

Present value,

$$= \frac{\text{Coupon}_1}{(1+y)^1} + \frac{\text{Coupon}_2}{(1+y)^2} + \dots + \frac{(\text{Coupon}_n + \text{Face value})}{(1+y)^n}$$

or $P_0 = C(PVIFA_{y,n}) + F(PVIF_{y,n})$

and here $y = YTM$

Assumptions Underlying YTM

The YTM of a bond represents the expected or required rate of return on a bond. While computing the YTM, the following assumptions are made,

1. All coupon and principal payments are made on schedule

2. The coupon payments are fully and immediately reinvested at precisely the same interest rate as the promised YTM.

Examples

1. A four year bond with a 7% coupon rate and maturity of ₹1000 is currently selling at ₹905. What is its yield to maturity?

Solution :

Given that,

Face value of a bond, $P_v = ₹1000$

Market value of bond, $P_0 = ₹905$

Coupon rate, $r = 7\%$

Coupon amount, $C = 7\%$ of ₹1000 = ₹70

Maturity, $n = 4$ years

YTM can be found out by using trial and error produce, let us try at 10%.

At 10%,

$$P_0 = c(PVAF_{10\%, 4 year}) + P_v(PVIF_{10\%, 4 year})$$
$$= 70(3.170) + 1000(0.683)$$
$$= 221.9 + 683 = 904.90 = ₹905$$

As present value of a bond's future cash flows is ₹905 at 10% and hence YTM is 10%.

2. Rahul recently purchased a bond with a ₹1000 face value, at 10% coupon rate and four years to maturity. The bond makes annual interest payments, the first to be received one year from today. Mr Rahul paid ₹1032 for the bond. What is the bond's yield to maturity?

Solution :

YTM can be found out by using trial and error procedure. Let us try at 10%

At 10%,

$$P_0 = C(PVIF_{10\%, 4}) + P_v(PVIAF_{10\%, 4})$$
$$100(3.170) + 000(0.683)$$
$$= 317 + 683 = ₹1000$$

But current market price is more, so lets try at 9%.

At 9%

$$P_0 = C(PVIF_{9\%, 4}) + P_v(PVIAF_{9\%, 4})$$
$$= 100(3.240) + 1000(0.708)$$
$$= 324 + 708$$
$$= ₹1032$$

∴ YTM = 9%

3. A 10 year bond with 14% coupon rate and with maturity value of ₹100 is currently selling at ₹80. What is its yield to maturity?

Solution :

Present market value of bond, $P_0 = ₹80$

Face value of bond, $P_v = ₹100$

Coupon rate, $r = 14\%$ PA

Maturity, $n = 10$ years

Coupon amount, $C = ₹14$

YTM can be found out by using trial and error procedure. Let us try at 18%.

$$P_0 = [C @ 18\% \text{ for } 10 \text{ years}] + [P_v @ 18\% \text{ for } 10^{th} \text{ year}]$$
$$= 14[PVIFA_{18\%, 10 year}] + 100[PVIF_{18\%, 10 year}]$$
$$= 14 \times 4.494 + 100 \times 0.191$$
$$= 62.916 + 19.1$$
$$= ₹82.016$$

But YTM is a discounting rate at which all future cash flow should be equal to present value of a bond.

Here at 18%, $P_0 = ₹82.016$ which is greater than present market value i.e., ₹80. So lets try at 19%.

At 19%

$$P_0 = [C @ 19\% \text{ for } 10 \text{ years}] + [P_v @ 19\% \text{ for } 10^{th} \text{ year}]$$
$$= C[PVAF_{19\%, 10}] + P_v[PVIF_{19\%, 10}]$$
$$= 14 \times 4.339 + 17.6$$
$$= 60.746 + 17.6$$
$$= 78.346$$

	YTM	P_0
Difference	1	3.67
Difference	?	2.016

$$YTM = 18 + \left[\frac{2.016}{3.67} \times 1\right]$$
$$= 18 + 0.549$$
$$= 18.55\%$$

Coupon amount $(c) = \dfrac{11}{100} \times 25,000$

$= ₹ 2750$

Maturity $(n) = 4$ years

YTM can be calculated by using trial and error method. Let us try 10%.

At 10%

$P_0 = c(\text{PVAF}_{10\%,} 4 \text{ years}) + P_n(\text{PVIF}_{10\%,}4)$

$= 2750 (3 170) + 25,000(0.683)$

$= 8717.5 + 17075$

$= ₹ 25,792.5$

Here at 10%, $P_0 = 25,792.5$ which is less than the present market value i.e., ₹ 26,201 So lets try at 9%

At 9%,

$P_0 = c \times (\text{PVAF}_{9\%,} 4 \text{ years}) + P_n (\text{PVIF}_{9\%,}4)$

$= 2750 (3 240) + 25,000(0 708)$

$= 8910 + 17700$

$= ₹ 26,610$

At 9% the P_0 values is higher than the present market value Hence, it is observed that the YTM lies between 9% and 10%.

Interpolation

	YTM	P_0
Difference	1	817.5(WN$_1$)
Difference	?	409 (WN$_2$)

$\text{YTM} = 9 + \left[\dfrac{409}{817 5} \times 1\right]$

$= 9 + 0 5003$

$= 9 5003\%$

Working Notes

WN$_1$

Actual $P_0 = 26,201$

P_0 at 9% $= 26,610$

Difference $= 409$

WN$_2$

P_n @ 9 % $= 26,610$

P_n @ 10% $= 25,792 5$

Difference $= 817 5$

2. A ₹ 1000 par value bond bears a coupon rate of 14% and matures after 10 years. Interest is payable semi-annually. Compute the value of the bond if the required rate of return is 16%. Determine the yield-to-maturity if it is purchased for ₹ 1100 and is held till its maturity by an investor.

Solution : Dec.-14, Q5(b)

Calculation of Value of the Bond with Semi-annual Interest

$P = \displaystyle\sum_{i=1}^{2n} \dfrac{C \cdot 2}{(1+r/2)^i} + \dfrac{M}{(1+r 2)^{2n}}$

$= C/2\,(\text{PVIFA}_{r/2,} 2n) + M(\text{PVIF}_{r/2,} 2n)$

Given that,

$C = 14\%$

$M = 1000$

$r = 16\%$

$n = 10$

Substituting values in the above equation

Coupon rate $= 14\%$ on 1000

$= 140$

$= \dfrac{140}{\left(1+\dfrac{16}{2}\right)^2} + \dfrac{1000}{\left(1+\dfrac{16}{2}\right)^{2 \times 10}}$

$= \dfrac{70}{(1.08)^i} + \dfrac{1000}{(1.08)^{20}}$

$= 70\,(\text{PVIFA}_{8\%,} 20) + 1000\,(\text{PVIF}_{8\%,} 20)$

$= 70(9.818) + 1000\,(0.215)$

$= 687 26 + 215$

$= ₹ 902 26$

Calculation of Yield to Maturity (YTM)

YTM can be calculated by using trial and error procedure Let us try at 12%

$P_0 = C(\text{PVIFA}_{12\%,} 10_{yr}) + P_n(\text{PVIF}_{12\%,} 10)$

$= 140(5.650) + 1000\,(0 322)$

$= 791 + 322$

$= 1113$

Here at 12%, $P_0 = 1113$ which is greater than present market price 1100. So let us try at 13%

$P_0 = C(\text{PVIFA}_{13\%,} 10) + P_n(\text{PVIF}_{13\%,} 10)$

$= 140\,(5.426) + 1000\,(0.295)$

$= 759.64 + 295$

$= 1054 64$

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	YTM	P_0	
Difference	1	58.36	→ WN3
Difference	2	13	→ WN2

$$\therefore \quad YTM = 12 + \left[\frac{13}{58.36} \times 1\right]$$

$$= 12 + 0.22$$

$$= 12.22\%$$

Working Note

1. Coupon amount (C) = 14% of 1000 = 140

2. P_0 at 2%   = 1113
    Less. Actual P_0 = 1100
    ∴ Difference   = $\underline{13}$

3. P_0 at 12%   = .113
    Less. P_0 at 13%   = 1054.64
    ∴ Difference   = $\underline{58.36}$

Value of Bonds

3. Calculate the value and duration for the following bonds assuming a YTM of 8% for both ABC and XYZ.

Bond	Years of Maturity	Annual Interest	Maturity Value
ABC	10	₹ 80	₹ 1,000
XYZ	15	₹ 65	₹ 1,000

Solution :   *Dec.-12/Jan.-13, Q3(b)*

Value of Bond

$$PV \quad \sum_{t=1}^{n} \frac{C}{(1+r)^t} + \frac{C_1}{(1+r)^n}$$

Values of ABC Bond

C 80

C = 1000

r = 0.08

n = 10

$$= \frac{80}{(1+0.08)^1} + \frac{80}{(1+0.08)^2} + \frac{80}{(1+0.08)^3} + \frac{80}{(1+0.08)^4} + \frac{80}{(1+0.08)^5} + \frac{80}{(1+0.08)^6} + \frac{80}{(1+0.08)^7} +$$

$$\frac{80}{(1+0.08)^8} + \frac{80}{(1+0.08)^9} + \frac{1080}{(1+0.08)^{10}}$$

$$= 74.07 + 68.58 + 63.50 + 58.80 + 54.44 + 50.41 + 46.67 + 43.22 + 40.01 + 500.24$$

$$999.94 \equiv 1000$$

Value of XYZ Bond

C = 65

C_1 = 1000

r = 0.08

n = 15

$$= \frac{65}{(1+0.08)^1} + \frac{65}{(1+0.08)^2} + \frac{65}{(1+0.08)^3}$$

$$+ \frac{65}{(1+0.08)^4} + \frac{65}{(1+0.08)^5} +$$

$$\frac{65}{(1+0.08)^6} + \frac{65}{(1+0.08)^7} + \frac{65}{(1+0.08)^8}$$

$$+ \frac{65}{(1+0.08)^9} + \frac{65}{(1+0.08)^{10}} +$$

$$\frac{65}{(1+0.08)^{11}} + \frac{65}{(1+0.08)^{12}} +$$

$$\frac{65}{(1+0.08)^{13}} + \frac{65}{(1+0.08)^{14}} +$$

$$\frac{1065}{(1+0.08)^{15}}$$

$$\approx 60.18 + 55.72 + 51.59 + 47.77 + 44.23 +$$

$$40.96 + 37.92 + 35.11 + 32.51 + 30.10 +$$

$$27.87 + 25.81 + 23.90 + 22.12 + 335.73$$

$$= 871.52 \cong 872$$

Duration of ABC Bond

$$\text{Duration} = \frac{\Sigma(t)(PV(C_t))}{\text{Value}}$$

$$t = 7.24$$

Years (t)	(C_t)	(PV)	(C_t) (PV) (t)
1	₹ 80	0.926	74.08
2	₹ 80	0.857	137.12
3	₹ 80	0.794	190.56
4	₹ 80	0.735	235.2
5	₹ 80	0.681	272.4
6	₹ 80	0.630	302.4
7	₹ 80	0.583	326.48
8	₹ 80	0.540	345.6
9	₹ 80	0.500	360
10	₹ 1080	0.463	5000.4
			Σ = 7244.24

$$\text{Duration} = \frac{\Sigma(C_t)(PV)(t)}{\text{Value}}$$

$$= \frac{7244.24}{.000}$$

$$= 7.24$$

Duration of XYZ Bond

Years (t)	(C_t)	(PV)	(C_t) (PV) (t)
1	₹ 65	0.926	60
2	₹ 65	0.857	111
3	₹ 65	0.794	155
4	₹ 65	0.735	191
5	₹ 65	0.681	221
6	₹ 65	0.630	246
7	₹ 65	0.583	265
8	₹ 65	0.540	281
9	₹ 65	0.500	293
10	₹ 65	0.463	301
11	₹ 65	0.429	307
12	₹ 65	0.397	310
13	₹ 65	0.368	311
14	₹ 65	0.340	309
15	₹ 1065	0.315	5032
			Σ = 8393

$$\text{Duration} = \frac{\Sigma(C_t)(PV)(t)}{\text{Value}}$$

$$= \frac{8393}{872}$$

$$= 9.625$$

4. A company's bonds have a par value of ₹100, mature in seven years, and carry a coupon rate of 12 percent payable annually. If the required rate of return on this bond is 16 percent, what price should the bond command in the market place?

Solution :

Given that,

As the annual interest payment would be ₹ 12 for 7 years and the principal repayment would be ₹ 100 after 7 years, then the value of bond at discount rate of 16% would be calculated as follows.

$$V = ₹ 12(PVIFA_{16\%, 7yrs}) + ₹ 100(PVIF_{16\%, 7yrs})$$

$$= ₹ 12(4.039) + ₹ 100(0.354) = 48.47 + 35.4$$

$$₹ 83.8$$

∴ The value of the bond in the market place at 16%
    = ₹ 83.87

5.   The face value of a bond is ₹1000/- with a coupon of 14% payable semi-annually. It have a life of 8 Years after which it would be redeemed at a premium of 6% over F.V. Find the YTM of the bond, if is market price is ₹896/-.

Solution :   *May/June-16, Q3(a)*

Given that,

Face value (P_o) = ₹ 1,000

Years to maturity (n) = 8 years

Market price (P_o) = ₹ 896

Coupon/interest rate (c) = 14%

As given in the question this is case of semi-annual coupon bond. So the coupon/interest rate should be divided by $2\left(\frac{14\%}{2} = 7\%\right)$ and years to maturity should be multiplied by 2 (8 × 2 = 16). Therefore, Coupon interest amount (semiannual) is 7% of 1000 i.e., ₹ 70

Calculation of YTM Based on Trial and Error Method

Let us try at 10% i.e., $\left(\frac{10}{2} = 5\right)$

$P_o = C\,(PVIFA_{5\%}, 16) + P_n\,(PVIF_{5\%}, 16)$

　= 70 (PVIFA$_{5\%}$, 16) + 1000 (PVIF$_{5\%}$, 16)

　= 70 (10.838) + 1000 (0.458)

　= 758.66 + 458

　= 1216.66

At the above percentage (10%) amount is getting too far from market price of ₹ 896, so let us try at 16%.

At 16% $\left(\text{i.e.,}\frac{16}{2} = 8\right)$

　= 70 (PVIFA$_{8\%}$, 16) + 1000 (PVIF$_{8\%}$, 16)

　= (70 × 8.851) + (1000 × 0.292)

　= 619.57 + 292

　= 911.57

At 18% $\left(\text{i.e.,}\frac{18\%}{2} = 9\%\right)$

　= 70 (PVIFA$_{9\%}$, 16) + 1000 (PVIF$_{9\%}$, 16)

　= 70 (8.313) + 1000 (0.252)

　= 581.91 + 252

　= 833.91

Now we have two values which are nearest to the market price of the bond. One is (₹ 911.57) greater than market price (₹ 896) and one ₹ 833.91) is less than market price (₹ 896)

Applying Interpolation Method

	TYM	%
Difference	2	(911.57 – 833.91) = 77.66
Difference	?	(911.57 – 896) = 15.57

YTM = $16 + \left[\frac{15.57}{77.66} \times 2\right]$

　= 16 + 0.40

　= 16.40.

6.   Mr. Sagar is considering the purchase of a bond currently selling at ₹ 878.50. The bond has four years to maturity with a face value of ₹ 1000/- and 8% coupon rate. The next annual interest payment is due after one year from today. The required rate of return is 10%.

   (i)   Calculate the intrinsic value of the bond. Should Sagar buy the bond?

   (ii)   Calculate the YTM of the bond.

Solution :   *(Model Paper-II, Q7(a) | May/June-16, Q3(b))*

(i)   Intrinsic Value of the Bond

$$P_e = \frac{C_1}{(1+Y)} + \frac{C_2}{(1+Y)^2} + \frac{C_3}{(1+Y)^3} + \frac{C_4+F.V}{(1+Y)^4}$$

$$= \frac{80}{(1+0.10)^1} + \frac{80}{(1+0.10)^2} + \frac{80}{(1+0.10)^3} + \frac{1,080}{(1+0.10)^4}$$

$= 72.73 + 66.12 + 60.11 + 737.65$

$= ₹ 936.6.$

   or

$P_e = C (PVIFA_{y,n}) + F (PVIF_{y,n})$

   $= C (PVIFA_{10\%, 4 \, years}) + F (PVIF_{10\%, 4 \, years})$

   $= 80 (3.170) + 1,000 (0.683)$

   $= 253.6 + 683$

   $= ₹ 963.6$

Thus, the intrinsic value is ₹ 936.6 and the market price of the bond is ₹ 878.50. As the bond is underpriced Mr.Sagar should buy the bond.

(ii)   YTM of the Bond

The yield to maturity of the bond can be found out of using trial and error. Let us try at 12%.

$$P = \frac{C_1}{(1+Y)^1} + \frac{C_2}{(1+Y)^2} + \frac{C_3}{(1+Y)^3} + \frac{C_4+F.V}{(1+Y)^4}$$

$$= \frac{80}{(1+0.12)} + \frac{80}{(1+0.12)^2} + \frac{80}{(1+0.12)^3} + \frac{1,080}{(1+0.2)^4}$$

$= 71.43 + 63.76 + 56.94 + 686.36$

$= 878.49$

   or

$P_e = C (PVIFA_{y,n}) + F (PVIF_{y,n})$

   $= C (PVIFA_{12\%, 4 \, years}) + F (PVIF_{12\%, 4 \, years})$

$878.50 = 80 (3.0373) + 1,000 (0.6355)$

$878.50 = 242.98 + 635.5$

$878.50 \quad 878.48$

The calculated bond yield is 12%, which is higher than the required rate of return. Hence, Mr. Sagar shuld purchase the bond.

2.5   BOND VALUATION – CAPITALIZATION OF INCOME METHOD

Q11 . What is bond valuation? Explain how the capitalization of income method is used in valuing bonds.

Answer :

Bond Valuation

Bond valuation is the process of determining the bond values. Bond values actually refers to the present values of securities like bonds, debentures etc. The present value of all the securities future cash flow is given by,

Present value,

$$= \left[\frac{Coupon_1}{(1+YTM)^1} + \frac{Coupon_2}{(1+YTM)^2} + \ldots + \frac{Coupon_n + Face\ value}{(1+YTM)^n} \right]$$

The Capitalization of Income Method

An investor who believes that the bond market is efficient would question the ability of other investors to identify mispriced situations. However, if an investor believes that such situations exist, then an economically sensible and logical approach to valuation is needed to identify them. One such approach is the capitalization of income method of valuation.

This method of valuation states that the intrinsic value of any asset is based on the discounted value of cash flows that the investor expects to receive in the future from owning the bond. The intrinsic value is to be compared with existing value of a bond, so as to state whether the bond is overpriced, underpriced or fairly priced. Another way is to compare the bond YTM (Yield To Maturity) with AYTM (Approximate Yield to Maturity).

If YTM > AYTM, then the bond is underpriced.

If YTM < AYTM, then the bond is overpriced. However,

If YTM - AYTM, then the bond is said to be fairly priced.

PROBLEM ON BOND VALUATION

1.   Sachin is considering investing in a bond current selling for ₹8785. The bond has four years to maturity, a ₹10000 face value and 8% coupon rate. The next annual payment is due one year from today. The approximate discount factor for investments of similar risk is 10%. Calculate the intrinsic value of a bond using capitalization of income method. Should Sachin purchase the bond?

Solution :

According to capitalization of income method, the intrinsic value of a bond is calculated as follows,

Year	Cash flows (₹)	PVIF @ 10%	PV_s (₹)
1	800	0.9091	727.28
2	800	0.8264	661.12
3	800	0.7513	601.04
4	10800	0.6830	7376.40
			P_s = 9365.84

Conclusion

The bond is actually selling for ₹8785.00, whereas its intrinsic value is ₹9365.84 and hence the bond is underpriced Therefore, Sachin should purchase it

2.6 BOND PRICE THEOREMS

Q12.   Explain briefly about various bond price theorems.

Answer :   *Model Paper-III, Q7(a)*

Bond Price Theorems

The value of the bonds depends upon three factors namely, the coupon rate, years to maturity and the expected yield to maturity. The relationship between them is determined by certain principles known as 'bond price theorems'

Theorem 1

The yield to maturity is inversely related to price of the bond. As yield to maturity increases, the price of the bond decreases and as yield to maturity decreases, the price of the bond increases.

Example

	Bond A	Bond B
Face value, P_n	₹1000	₹1000
Coupon rate, r	10%	10%
Maturity, n	5 years	5 years
YTM	12%	14%

Determine price of bond A and bond B.

Solution :

(i) Calculation of Price of Bond A

$$P_0 = C(PVIFA_{12\%, 5}) + P_n(PVIF_{12\%, 5})$$
$$= 100(3.605) + 1000(0.567)$$
$$= 360.50 + 567.00$$
$$= ₹927.50$$

(ii) Calculation of Price of Bond B

$$P_0 = C(PVIFA_{14\%, 5}) + P_n(PVIF_{14\%, 5})$$
$$= 100(3.433) + 1000(0.519)$$
$$= 343.30 + 519.00$$
$$= ₹862.30$$

Hence, it is being proved that, if YTM increases (i.e., from 12% to 14%) then bond price decreases (i.e., from ₹ 927.50 to ₹ 862.30) keeping the other determinants constant.

Working Notes

$$C = r\% \text{ of } P_n$$
$$= 10\% \text{ of } ₹1000$$
$$= ₹100 \text{ (same for } A \text{ and } B)$$

Theorem 2

For a difference between the coupon and the YTM, the extent of change in the price of the bond depends on the remaining term of the maturity. The larger the period, the greater will be the price change.

Example

	Bond A	Bond B
Per value	₹1000	₹1000
Coupon rate	10%	10%
Yield	15%	15%
Maturity	2 years	3 years

Calculate the market price and price change for bond A and B.

Solution :

(i) Calculate Market Price and Price Change for Bond A

$$P_0 = C(PVIFA_{15\%, 2}) + P_n(PVIF_{15\%, 2})$$
$$= 100(1.6257) + 1000(0.7561)$$
$$= 162.57 + 756.1$$
$$= ₹918.67$$

$$\therefore \text{ Price change} = P_n - P_0$$
$$= 1000 - 918.67$$
$$= ₹81.33$$

(ii) Calculate Market Price and Price Change for Bond B

$$P_0 = C(PVIFA_{15\%, 3}) + P_n(PVIF_{15\%, 3})$$
$$= 100(2.2832) + 1000(0.658)$$
$$= 228.32 + 658 = ₹886.32$$

$$\therefore \text{ Price change} = P_n - P_0$$
$$= 1000 - 886.32$$
$$= ₹113.68$$

Conclusion

For a given difference between coupon rate (10%) and YTM (15%), the price change for bond A having 2 years of maturity is ₹81.33 whereas for B with a maturity of 3 years is ₹113.68. Hence, it is proved that larger the maturity the greater will be the price change.

Theorem 3

The percentage change in the price of a bond associated with the changes in the yield to maturity will be at a diminishing rate as the term to maturity increases.

Example

Consider a bond with a face value of ₹1000 and carrying a coupon rate of 10%. Calculate market value of a bond with maturities of 3, 5 and 8 years at a YTM of 12% and 14%.

Solution :

Given that,

Face value, $P_n = ₹1000$

Coupon rate, $r = 10\%$

The computation of market value with different maturities and at different yields can be summarized as follows.

YTM/Maturities	3 years	5 years	8 years
12%	952.20	927.88	900.59
14%	907.13	862.30	814.45
Percentage change	4.83%	7.77%	10.24%
Rate of change	60.87%		31.79%

Conclusion

It is proved that, the bond prices increases with a diminishing rate as the term to maturity increases.

Working Notes

1. $P_a = ₹1000$

       $r = 10\%$

       $n = 3$ years

       YTM = 12%

   $\therefore$ $P_0 = C(PVIFA_{12\%, 3}) + P_a(PVIF_{12\%, 3})$

         $= 100(2.402) + 1000(0.712)$

         $= 240.20 + 712.00 = ₹952.20$

Similarly,

2. $P_a = ₹1000$

       $r = 10\%$

       $n = 3$ years

       YTM = 14%

   $\therefore$ $P_0 = ₹907.13$

3. $P_a = ₹1000$

       $r = 10\%$

       $n = 5$ years

       YTM = 12%

   $\therefore$ $P_0 = ₹927.88$

4. $P_a = ₹1000$

       $r = 10\%$

       $n = 5$ years

       YTM = 14%

   $\therefore$ $P_0 = ₹862.68$

5. $P_a = ₹1000$

       $r = 10\%$

       $n = 8$ years

       YTM = 12%

   $\therefore$ $P_0 = ₹900.59$

6. $P_a = ₹1000$

       $r = 10\%$

       $n = 8$ years

       YTM = 14%

   $\therefore$ $P_0 = ₹814.45$

7. Percentage change,

     With 3 years of maturity,

$$= \frac{952.20 - 907.13}{952 - 20} \times 100$$

$$= 4.83\%$$

Similarly, for 5 years = 7.77 % and

For 8 years = 10.24%

8.   Rate of change $= \frac{7.77 - 4.83}{4.83} \times 100 = 60.87\%$

and then similarly it is 31.79%.

Theorem 4

For any given maturity, a decrease in yield causes the capital gain which is larger than the capital loss resulting from an equal increase in yields.

Example

Let us consider the following data,

Face value, $P_a = ₹1000$

Coupon rate, r = 10%

Maturity, n = 5 years

Calculate price of a bond, if its YTM is 12%. Also find out capital gain/loss when YTM changes to 8% and 16%.

Solution :

(i)   Calculation of Bond's Price when YTM is 12%

$$P_0 = C(PVIFA_{12\%, 5}) + P_a(PVIF_{12\%, 5})$$

$$= 100(PVAF_{2\%, 5}) + 1000(PVIF_{12\%, 5})$$

$$= ₹927.91$$

(ii)   Calculation of Bond's Price when YTM is 16%

$$P_0 = C(PVIFA_{16\%, 5}) + P_a(PVIF_{16\%, 5})$$

$$= ₹803.54$$

(iii)   Calculation of Bond's Price when YTM is 8%

$$P_0 = C(PVIFA_{8\%, 5}) + P_a(PVIF_{8\%, 5})$$

$$= ₹1079.85$$

(iv)   Calculation of Capital Gain/Loss

   (a)   When YTM increases from 12% to 16%

        (i.e., increase by 4%)

        Capital loss = 927.91 – 803.54

               ₹124.37

   (b)   When YTM decreases from 12% to 8%

        (i.e., decrease by 4%)

        Capital gain = 1079.85 - 927.91

              = ₹151.94

Hence, it is proved that capital gain is more than capital loss for corresponding change in YTM.

Theorem 5

The percentage change in a bond's price owing to a change in its yield will be smaller if its coupon rate is higher.

Example

Let us consider the following data,

	Bond A	Bond B
Face value, P_n	₹1000	₹1000
Maturity, n	5 years	5 years
Coupon rate, r	10%	12%
YTM , I	12%, 14%	12%, 14%

Calculate price of a bond A and bond B when YTM is 12% and 14%.

Solution :

Calculation of Bond's Price

YTM	Bond A	Bond B
12%	₹ 927.91	₹ 1000
14%	₹ 862.68	₹ 931.342
Percentage change	7.03%	6.86%

Hence percentage change in bond's price with a given change in YTM is smaller when coupon rate is higher.

Working Notes

1. Change (Bond A) = 927.91 − 862.68

   = ₹65.23

   Percentage change = $\dfrac{65.23}{927.91} \times 100$

   = 7.03% or 7.01%

2. Change (Bond B) = ₹68.658

   Percentage change = $\dfrac{68.658}{1000} \times 100 = 6.86\%$

2.7 VALUATION OF COMPULSORILY CONVERTIBLE BONDS

Q13. Explain the method for valuing debenture that is compulsorily convertible (partially or fully) into equity shares.

Answer :   *April/May-11, Q3(a)*

Valuation of Compulsorily Convertible Debentures (CCD)

The value of the Compulsorily Convertible Debentures (CCD) is transformed into specified number of equity shares, either fully or partly, when the debentureholders obtain interest for a specific rate and specific period. When the debentures are converted partially, then the debentureholders tend to receive interest on the residual or remaining portion for the remaining period and finally the amount is redeemed. While valuing CCD, the associated cash flows are here under.

(a) Amount of interest which is received from the company at regular intervals.

(b) Share's expected market price which is received at the time of converting.

(c) Amount of redemption, if at all exists.

∴ The valuation of CCD,

$$B_n(CCD) = \sum_{i=1}^{n} \frac{Int_i}{(1+k_d)^i} + \frac{mP_i}{(1+k_e)^i} + \frac{RV}{(1+k_d)^n}$$

Where,

$B_n(CCD)$ = CCD value

Int_i = Amount of interest received on yearly basis

k_d = Rate of discounts for bonds

m = Shares received while conversion time

P_i = Price of a share at the conversion time

k_e = Required rate of return on equity component

RV = Value of redemption, if any

n = Debentures life

When the debentures are converted partially then the interest which is received before conversion would be different to the interest value after conversion. Usually, interest is received on annual basis. When the debentures are converted fully, there would be no such circumstances. Therefore, RV does not exist.

2.7.1 Valuation of Optionally Convertible Bonds

Q14. Write in detail about valuation of optionally convertible bonds.

Answer :

Valuation of Optionally Convertible Debentures (OCD)

Selecting the conversion process is just an option to the debentureholders. Debentureholder decides to choose conversion process only when the debenture value is higher after conversion when compared to the value before conversion. Therefore, debentureholder exclusively possesses two options.

(i) **Continue as Debentureholder**

It is a straight debenture value and calculated as following,

$$B_n = \sum_{i=1}^{n} \frac{Int_i}{(1+k)^i} + \frac{RV}{(1+k)^n}$$

This is the value bond valuation which has been explained clearly in the topic 'bond valuation'.

(ii) Choosing for Conversion

If the debentureholder decides to opt conversion process then these debentures turn into compulsorily convertible debentures, thereby calculating the value of OCD by CCD.

$$\therefore \quad B_o = \sum_{t=1}^{n} \frac{Int_t}{(1+k_d)^t} + \frac{mP_t}{(1+k_e)^t} + \frac{RV}{(1+k_d)^n}$$

Detailed explanation with regard to above equation is provided in valuation of optionally convertible debentures.

Usually, conversion if possible on yearly basis from the date of issue.

2.7.2 Valuation of Deep Discount Bonds

Q15. Explain how deep discount bonds can be valued.

Answer :

Valuation of Deep Discount Bond (DDB)

DDB is a debt instrument which is issued by financial institutions. DDBs possess issue price and face value. On the date of maturity, the holder receives this issue price and face value.

At the maturity time, as DDB possesses only one future cash flow, it needs to be equaled to the present value and discounted at the investor's required rate of return.

$\therefore$ DDB valuation is as follows,

$$B_o(DDB) = \frac{FV}{(1+k)^n}$$

Where,

$B_o(DDB)$ = Value of the DDB

FV = Per or Face value of DDB payable on maturity date

k = Required rate of return

n = Number of years

Example

A DDB is issued for a maturity period of ten years and possessing a per value of ₹50000. Find out the value of the DDB, given that the required rate of return is 20%.

Solution :

Value of DDB

$$B_o(DDB) = \frac{FV}{(1+k)^n}$$

$FV = 50000$

$k = 20\% = 0.20$

$n = 10$ years

$$B_o(DDB) = \frac{50000}{(1+0.20)^{10}}$$

$$= 50000 \times PVF_{(20\%,\ 10)}$$

$$= 50000 \times 0.162$$

$$= 8100$$

$\therefore$ The value of the bond = ₹ 8100.

2.8 BOND DURATION: MACAULAY'S DURATIONS AND MODIFIED MACAULAY'S DURATION

Q16. What is bond duration? How it can be calculated by Macaulay's duration method and modified Macaulay's duration?

Answer :

Bond Duration

Duration measures the time structure of a bond and the bond's interest rate risk. The time structure of investment in bonds is expressed in two ways. The common way to state is how many years he has to wait until the bond matures and the principal money is paid back.

This is known as asset's time to maturity or its years to maturity. The other way is to measure the average time until all interest coupons and the principal is recovered.

This weight average of time periods to maturity, weights being present values of the cash flow in each time period. The formula for duration is,

$$D = \frac{\dfrac{C_1}{(1+r)}}{P_o} + \frac{\dfrac{C_2}{(1+r)^2}}{P_o} + \dots + \frac{\dfrac{C_t}{(1+r)^t}}{P_o} \times T$$

This can be summarized as,

$$D = \sum_{t=1}^{T} \frac{P_v(C_t)}{P_o} \times t$$

Where,

D = Duration

C = Cash flow

r = Current yield to maturity

T = Number of years

$P_v(C)$ = Present value of the cash flow

P_o = Sum of the present values of cash flow

As this model is developed by F R Macaulay in 1938, it is known as Macaulay's Duration. It is also known as 'Continuous Model'.

Examples

1. Determine Macaulay's duration of a bond that has a face value of ₹1000, an 8% annual coupon rate and 4 years until maturity. The bonds YTM is 10%.

Solution :

CF = Cash flows i.e., coupon amount

= ₹ 80

Received in year 1, 2 and 3 but in 4th year it is coupon amount and principal

I.   **Calculation of Price of a Bond**

Year	CFs	PVIF@10%	PV$_b$
1	80	0.9091	72.73
2	80	0.8264	66.11
3	80	0.7513	60.10
4	1080	0.6830	737.64
		Bond Price, P$_o$	= 936.58

II.   **Determination of Macaulay's Duration**

Year	PVCF (PV$_i$)	PVCF as proportion of P (W$_i$)	n × W$_i$
1	72.73	0.0777	0.0777
2	66.11	0.0706	0.1412
3	60.10	0.0641	0.1923
4	737.64	0.7876	3.1504
		P$_o$ = 936.58	MD = 3.5616

.   Macaulay's duration = 3.56 years

Calculation of Macaulay's duration for semiannual bonds.

$$MD = \frac{C\left[(Z)^{(T)m+1}\; Z\; (YTM)(T)+(MV)(T)(m)\left(\dfrac{YTM}{m}\right)^2\right]}{C\left(\dfrac{YTM}{m}\right)\left[(Z)^{(T)m}-1\right]+MV\left(YTM/m\right)^2}$$

$$Z = \left(1+\frac{YTM}{m}\right)$$

Where,

m = Number of compounding periods in a year

T – Number of years until maturity,

MV = Face value

YTM = Yield to maturity out an annual rate

C = Coupon per period

2.   **Determine Macaulay's duration of a bond that has a face value of Rs. 1000, an 8% annual coupon rate and 18 years until maturity. The bonds YTM is 12%. Compoundings are semiannual.**

Solution :

$$MD = \frac{60\left[(1.06)^{37}-(1.06)-(.12)(18)\right]+(1000)(18)(2)(.06)^2}{60(0.06)\left[(1.06)^{36}-1\right]+1000(0.06)^2}$$

$$= \frac{450.05}{29.33} = 15.344$$

Semiannual $MD = \dfrac{15.344}{2} = 7.67$ years

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Modified Macaulay's Duration

The relationship between a change in the price of a bond relative to change in its yield to maturity is usually referred to as Modified Macaulay's duration

The relationship between a change in price of a bond to a change in YTM is,

$$\frac{\Delta P_0}{\Delta YTM} = -\left(\frac{1}{1+YTM}\right) \times MD \times P$$

Where, P_0 is Bond's price and $\frac{\Delta P_0}{\Delta Y + M}$ indicates change in bond's price with corresponding change in YTM

Therefore, it can be determined as follows,

$$MMD = \frac{MD}{1+YTM}$$

Where,

      MMD = Modified Macaulay's Duration

      MD = Macaulay's Duration

      YTM = Yield to Maturity.

Example

Determine Macaulay's duration of a bond that has a face value of ₹ 100, 13% coupon rate and 3 years until maturity. The bonds YTM is 18%. What is MMD for this bond?

Solution :

(i) **Calculation of Bond's Price**

$$P_0 = C(PVIFA_{18\%,3}) + P_a(PVIF_{18\%,3})$$
$$= 13 \times 2.577 + 100 \times 0.794$$
$$= 33.501 + 79.40$$
$$= ₹112.901$$

(ii) **Calculation of Macaulay's Duration**

$$MD = [(1 \times C_1 \times PVIF_{18\%,1}) + (2 \times C_2 \times PVIF_{18\%,2}) + [3 \times (C_1 + P_a) \times PVIF_{18\%,3}]] \div P_0$$
$$= [(1 \times 13 \times 0.926) + (2 \times 13 \times 0.857) + (3 \times 113 \times 0.794)] \div 112.90$$
$$= 303.486 \div 112.901 = 2.688 \text{ years}$$

(iii)   **MMD** $= \dfrac{MD}{1+YTM} = \dfrac{2.688}{1+0.18}$

$$= 2.278 \text{ years}$$

PROBLEMS ON BOND DURATION

1. The National Thermal Power Corporation recently issued a ₹1,000, 12 percent, semiannual bond with 20 years to maturity.

   (i) What will be the price of the bond if the market rate of interest is 14 percent?

   (ii) Determine the Bond' Macaulay's duration when it was issued, and

   (iii) 2 years later the issue.

Solution :   *April/May-09, Q3(b)*

(i) **Bond's Price**

$$P_0 = \sum_{t=1}^{2T} \frac{SiF}{(1+YTM/2)^t} + \frac{F}{(1+YTM/2)^{2T}}$$

$$P_0 = \frac{₹60}{(1+.07)^1} + \frac{₹60}{(1+.07)^2} + \cdots + \frac{₹60+₹1000}{(1+.07)^{40}}$$

$$= \sum_{i=1}^{40} \frac{₹60}{(1+07)^i} + \frac{₹1000}{(1+.07)^{40}}$$

$= ₹60 \times PVA(i, T) + ₹1000 \times PV(i, t)$

[Since it is an semiannual problem, we have to multiply 'T' with '2' and rate of interest must be divided by 2]

Where $i = T$ and $t = T = 40$

$P_n = ₹60 \times PVA(7, 40) + ₹1000 \times PV(7,40)$

$= ₹60 \times 12.332 + ₹1000 \times .067$

$= ₹739.92 + ₹67$

$₹806.92$

(ii) Calculation for Bond's Macaulay's Duration

$$MD = \frac{C\left[(Z)^{(T)(m)+1} - Z - (YTM)(T)\right] + (MV)(T)(m)\left(\dfrac{YTM}{m}\right)^2}{C\left[\dfrac{YTM}{m}\right]\left[(Z)^{(T)(m)} - 1\right] + MV\left(\dfrac{YTM}{m}\right)^2}$$

$$MD = \frac{₹60[(1.07)^{17} - 1.07 - 2.52] + (₹1000)(18)(2)(.0049)}{(₹60)(.07)[(1.07)^{36} - 1] + (₹1000)(.0049)}$$

$= 14.548$ Semiannual period

(or)

$= \dfrac{14.548}{2}$

7.274 years.

(iii) Two Years After Issue of Duration

$$MD = \frac{₹60[(1.07)^{17} - 1.07 - 2.52] + (₹1000)(18)(2)(.0049)}{(₹60)(.07)[(1.07)^{16} - 1] + (₹1000)(.0049)}$$

$= 14.264$ Semiannual period

(or)

$= \dfrac{14.264}{2}$

$= 7.132$ years

Since, we have to determine the duration after 2 years of an semiannual issue (i.e., 4 years).

---

2. Based on the given informations calculate the Macauley's duration and modified duration face value of the bond is ₹1,000, coupon rate 7%, maturity 4 years, YTM 10%.

Solution :

CF = Cash inflows i.e., coupon amount

$= 1000 \times 7\%$

$= ₹70$

Received in year 1,2 and 3 but in 4th year it is coupon and principal.

1.   Calculation of Price of a Bond

Year	CF$_t$	PVIF@10%	PV$_t$
1	70	0.9091	63.637
2.	70	0.8264	57.848
3.	70	0.7513	52.591
4	1070	0.6830	730.810
		Bond Price, P$_t$ = 904.89	

2.   Determination of Macaulay's Duration

Year	PVCF (PV$_t$) of P$_t$(W)	PVCF Proportion	n × W$_t$
1	63.637	0.07033	0.07033
2	57.848	0.064	0.1280
3	52.591	0.05812	0.1744
4	730.810	0.8076	3.2304
	P$_t$ = 904.89		MD = 3.6031

∴   Macaulay's durations = 3.60 years
     Modified Macaulay's duration

$$MMD = \frac{Macauly's\ duration}{1+YTM}$$

$$= \frac{3.60}{1+0.10} = \frac{3.60}{1.10}$$

$$= 3.27\ years$$

3.   A company had issued bonds with a face value of ₹.1000, coupon of 12% payable semi-annually and time to maturity of 8 years. The market rate of interest is 14%. Find the duration of the bond two years after it is issued.

Solution :   Dec.-15, Q3(a)

Macaulay's Duration of the Bond Two Years After it is Issued

$$MD = \frac{C\left[(Z)^{(n\times m)} - Z - (YTM)(n)\right] + (P_a)(n)(m)\left[\frac{YTM}{m}\right]^2}{C\left[\frac{YTM}{m}\right]\left[(Z)^{n\times m} - 1\right] + P_a\left[\frac{YTM}{m}\right]^2}$$

Where,

    C = Coupon per period

    n = Number of years until maturity

    m = Number of compounding periods in a year

    P_a = Face value

    YTM = Yield to maturity per period

    $Z = \left[\frac{1+YTM}{m}\right]$

Here,

    $YTM = 0.14$

    $n = 6$

    $m = 2$

    $P_a = 1,000$

    $Z = 1 + \frac{0.14}{2}$

    $= 1 + 0.07$

    $= 1.07$

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$C = 1,000 \times 12\%$

$= \dfrac{120}{2} = ₹60$

$MD = \dfrac{60\left[(1.07)^{13}\ 1.07\ \ 0.84\right] + (1,000)(6)(2)(0.0049)}{60(0.07)\left[(1.07)^{12}\ 1\right] + (1,000)(0.0049)}$

$= \dfrac{60[2.41 - 1.07 - 0.84] + 12,000(0.0049)}{4.2[2.25 - 1] + 4.9}$

$= \dfrac{60(0.5) + 58.8}{4.2(1.25) + 4.9} = \dfrac{30 + 58.8}{5.25 + 4.9} = \dfrac{88.8}{10.15}$

$= 8.749$ semiannual periods or

$= \dfrac{8.749}{2} = 4.37$ years.

4. Calculate the duration for bond 'A' and bond 'B' with 7% and 8% coupons having a maturity period of 4 years. The face value of the bonds are ₹ 1000/- and both the bonds are currently yielding 6%. Which one is advisable and why?

Solution :   *(Model Paper-I, Q7(b) Dec.-15, Q3(a) April/May-14, Q3(b))*

Macaulay's Duration

$$D = \dfrac{C_1}{(1+r)}\ 1 + \dfrac{C_2}{(1+r)^2}\ 2 + \dfrac{C_3}{(1+r)^3}\ 3 + \dfrac{C_4}{(1+r)^4}\ 4$$
$$\quad\ P_0 \qquad\qquad P_0 \qquad\qquad P_0 \qquad\qquad P_0$$

Calculation of Macaulays duration for bond A with a coupon rate of 7%

Year	Cash Flow C_t	PV @ 6% $\dfrac{1}{(1+r)^t}$	PV = C_t	$\dfrac{C_t}{(1+r)^t}$ $\dfrac{}{P_0}$
1	70	0.943	66.01	0.0638
2	70	0.890	62.3	0.0606
3	70	0.840	58.8	0.0568
4	1070	0.792	847.44	0.8192
			$P_1 = 1034.55$	

Substituting the values in Macaulay's duration formula.

$D = 0.0638 \times 1 + 0.0602 \times 2 + 0.0568 \times 3 + 0.8192 \times 4$

$0.0638 + 0.1204 + 0.1704 + 3.2768$

$= 3.6314$ years

Calculation of Macaulay's duration for bond B with a coupon rate of 8%

Year	Cash Flow C_t	PV @ 6% $\dfrac{1}{(1+r)^t}$	PV × C_t	$\dfrac{C_t}{(1+r)^t}$ $\dfrac{}{P_0}$
1	80	0.943	75.44	0.0705
2	80	0.890	71.2	0.0665
3	80	0.840	67.2	0.0628
4	1080	0.792	855.36	0.8000
			$P_1 = 1069.2$	

Substituting the values in Maculay's duration formula.

$$D = 0.0705 \times 1 + 0.0666 \times 2 + 0.0628 \times 3$$
$$+ 0.8000 \times 4$$
$$= 0.0705 + 0.1332 + 0.1884 + 3.2$$
$$= 3.5921 \text{ years}.$$

∴ Hence, Bond 'B' is advisable. Since bond 'B' with higher coupon payments has a shorter duration when compared to the bond 'A' with a lower coupon rate.

2.8.1 Bond Convexity

Q17. Explain the concept of bond convexity.

Answer :

Bond Convexity

Price of a bond and its yield are inversely relative. The rise in bond price would cause a fall in yield and vice-versa. This has been proved in theorem 1 of bond price theorem. According to theorem 4, the relationship is not linear

The quantum increase in the bond's price for a given decline in the yield is higher than the decline in bond's price for a similar amount of increase in bond's yield. Hence relationship is not linear. This relationship is often referred to convexity and it measures the sensitivity between them.

The concept of convexity is applicable to all types of bonds. The degree of convexity differs from bond to bond depending upon the size of the bond, the years to maturity and the current market price.
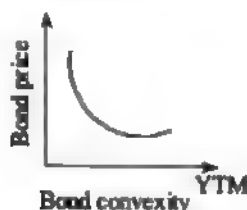

Figure: Bond Convexity

Interest Rate Risk

It is defined as price fluctuation caused in a security due to the simultaneous changes in discount rate i.e., YTM.

Interest rate risk is measured with the help of bond's elasticity, which determines the effect of YTM of bond's interest rate risk. It is the percentage change in the price of a bond for every percentage change in YTM

Bond elasticity = Percentage change in price

$$= \frac{-\text{Duration} \times \Delta YTM}{1 + YTM}$$

PROBLEM ON BOND CONVEXITY

1. **If the duration of a bond is 2.68 years, its YTM is 14% and changed YTM is 14.5%. Find bond elasticity.**

Solution :

$$\text{Bond Elasticity} = \frac{-\text{Duration} \times \Delta YTM}{1 + YTM}$$
$$= \frac{-2.68 \times 0.005}{1 + 0.14} = \frac{-0.0134}{1.14}$$
$$= -0.01175 \text{ or} - 1.18\%$$

Working Notes

$$\Delta YTM = \text{Change in YTM}$$
$$0.145 - 0.140 = 0.005$$

2.9 CONSIDERATIONS IN MANAGING A BOND PORTFOLIO

Q18. Explain the important factors that are taken into account while managing the bond portfolio.

Answer :

The first factor taken into account by the investors is, to know the main essence of the bond market. Bond market gets benefited by the weak economy. The increase in economy will tend to increase in bond prices and further decreases the interest rates. The decrease in economy will reduce the scope of investment and this leads to inclination for the need of their bonds, which increases the bond price and decreases the bond yields.

The fast growing economy posses threat to the bond investors. Bond investors are concerned with the association of bond yields and inflation, rather than association of economic growth and bond yield.

If the bond investor estimates, rise in inflation then, it will lead to increase in bond yields and decrease in bond prices. Bond investor acts towards expected future inflations, not towards present inflations. As the inflation has a negative impact on fixed income securities, it is disliked by most of the bond investors. Even though the bond market appears as a weak economy, it dislikes inflation.

The Fed (federal reserve) decreases the fear of bond investors, as 'Fed' controls economic growth and minimizes the inflation and the bond investor can act supportively towards the monetary policy, because it reduces the inflation fear.

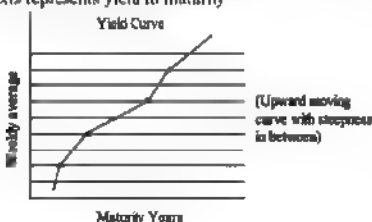### 2.9.1 Term Structure of Interest Rates

Q19. Explain about the term structure of interest rates.

Answer :

The term structure of interest rates is a connection between time to maturity and yield for a particular category of bonds at a particular time by keeping all the factors constant, especially the default risk. Mostly if the length of time to maturity is more, the more will be the interest rates.

The term structure scenario is outlined by yield curve.

Yield curve is a graphical representation, which shows the connection between the length of time to maturity and yields, where the X axis represents time to maturity and Y-axis represents yield to maturity.

Yield Curve

(Upward moving curve with steepness in between)

Maturity Years

Figure

The yield curve basically includes the instincts but not the actual connection between the yield and time to maturity. Therefore, this yield curve is not fit for showing the connection between yield and time to maturity.

2.4.2 Term Structure Theories

Q20. Describe various theories proposed for understanding the term structure of interest rates.

Answer :   *Model Paper-II, Q7(b)*

Term Structure Theories

The term structure theories of interest rates are used for describing the shape, slope and reasons for its changes (shifts of the yield curve). The term structure theories are,

1. Pure or unbiased expectation hypothesis theory
2. Liquidity preference theory
3. Segmented market theory
4. Preferred habitat theory

1. Pure or Unbiased Expectation Hypothesis Theory

This theory specifies that there exists evenly balanced amount between long term rate of interest and an average returns of short-term rates. Apart from these, the expected present short-term returns which are expected to prevail for the long period of time.

In expectation theory, the long term rates should be an average of present, short term rates and also be an average of future short term rates.

This expectation theory states that, today's rates and future expected rates have a connection and after ascertaining under the hypothesis, this theory concludes that "investors may anticipate identical return by not considering the option of investment". The yield curve for expectation hypothesis will be flat.

Explanation

R_n ⇒ Securities current known yield at time 't' with 'n' periods to maturity

$_{t+1}r_n$ → The yield that is likely to prevail an year from today at time '$t + 1$' for 'n' periods (i.e., the forward rates)

The 3 years bond rate should be a geometric average of the current 1 year rate (i.e., R_1) and the expected forward rates for subsequent 2 years.

Equation

Where,

R_3 ⇒ $[(1 + {_tR_1})(1 + {_{t+1}r_1})(1 + {_{t+2}r_1})]^{1/3} - 1.0$

R_3 → Rate on 3-year bond

$(1 + R_1)$ → Known rate on a current 1 year bond

$(1 + {_{t+1}r_1})$ → Expected rate on a bond with 1 year to maturity beginning 1 year from the current year.

$(1 + {_{t+2}r_1})$ → Expected rate on a bond with 1 year to maturity beginning 2 years from the current year.

Example

If the current one-year bond rate ($_tR_1$) is 0.06 and forward rate 0.085 for ($_{t+1}r_1$) and 0.092 for ($_{t+2}r_1$). What would be the rate for 3 year bond $_tR_3$?

Solution :

Equation :

$R_3 = [(1 + R_1)(1 + {_{t+1}r_1})(1 + {_{t+2}r_1})]^{1/3} - 1.0$

$_tR_3 = [(1 + 0.06)(1 + 0.085)(1 + 0.092)]^{1/3} - 1.0$

$= [(1.06)(1.085)(1.092)]^{1/3} - 1.0$

$= (1.2559092)^{1/3} - 1.0$

$= 1.07890 - 1.0$

$= 0.0789$ or 7.89%

The identical rule is followed for various number of periods. All long term rates are a geometric average of subsequent one-period rates.

2. Liquidity Preference Theory

This theory specifies the same rule as of the expectation theory, but it also includes the risk premiums for its hypothesis.

Liquidity preference theory = Expectation theory + Liquidity risk premiums.

The distinguished features between liquidity preference theory and expectation hypothesis theory are,

(i) Uncertainty in expected interest rates and

(ii) Expected future rates are not similar when compared to forward rates.

Ultimately, this theory concludes that the prolonged term bonds have to be put forward for the higher yields. Thus, yield curve under this theory has upward sloping direction.

3. Segmentated Market Theory

In segmentated market theory, several investors, instead of containing distinctive maturity requirements, restrict themselves to a particular maturity segment. The investor does not want to move from one to the other maturity sector even though it possesses benefits from the consequences which occurs.

The yield curve in this segmentated market theory depends upon the supply and demand determinants, curve can come to any shape, it can slope downwards or upwards accordingly.

4. Preferred Habitat Theory

This theory of preferred Habitat is like segmentated market theory but varies to a certain extent. The investor has option for maturity sector and different habitats. The investor who wishes to move to any maturity sector, provided, if they fairly obtain a suitable risk premiums under this theory.

The expected future interest rates and risk premiums play a crucial role in this hypothesis and yield curve can have any shape.

2.5.1 Risk Structure of Interest Rates

Q21. How the risk structure of interest rates have an impact on liquidity and taxes?

Answer :

The risk structure of interest rate defines the connection in between several bonds yield depending upon specific issuer and issue features that the bond contains.

Bonds with Same Term to Maturity Have Different Interest Rates

The relationship among these interest rates is called risk structure of interest rates. Risk structure of interest rate is also called as 'yield spreads' or 'risk premium'.

The one attribute of a bond which influences its interest rate is called as 'risk of default'. Risk of default occurs when the issuer of the bond is unable to make interest returns when he is promised to, or payoff the face value when bond matures.

Corporation can suffer huge losses and thus, may default of paying the interest rates on bonds. The default risk on the corporation bonds therefore likely to be very high. By contrast, treasury bonds have usually been considered to have no default risk, as the government can always increase taxes to pay off its obligation. The bonds with this elements are called as 'default free bonds'.

The spread between the interest rate on the bond with default risk and default free bonds called as "Risk Premium". Supply and demand analysis helps to analyze why the risk premium exists in the market.

If the probability of default risk increases the corporation suffers from a big loss, the default risk on corporation bond will increase, the expected return of the bond will decline, as the expected return of the corporation bonds relative to the risk free bonds declines, the demand curve will shift to the left.

At the same time the expected return on the default free treasury bonds increases relative to the expected return of the corporate bonds and then the riskyness of the treasury bonds will get declined. The treasury bonds gets more desirable and the demand curve will shift to the right.

(a) Risk structure of interest rates and liquidity.

(b) Risk structure of the interest rates and income tax consideration.

(a) Risk Structure of Interest Rates and Liquidity

The other attribute of bond that influences its interest rate is its liquidity. A liquid asset is one that can be quickly and easily converted into cash if need arises. The more liquid is an asset is more desirable it is. For example treasury bills are more liquid as it is widely traded and they are easiest to sell quickly and the loss of selling is very low. Corporation bonds are not as liquid as treasury bills.

Corporate bonds become less liquid. Less liquid corporate bonds shifts left and relative more liquid treasury bonds shifts right. The outcome is risk premium rises. Risk premium reflects not only corporate bonds default risk, but also lowers the liquidity.

(b) Risk Structure of the Interest Rates and Income Tax Consideration

The muncipal bonds are not liquid as treasury bonds. Muncipal bonds are prone to default risk. The muncipal bonds consists of lower interest rates than the treasury bonds. The tax advantage of muncipal bonds.

♦ Have to pay 35% tax

♦ With coupon rate 10% for ₹1000/- face value gives 100.

♦ With muncipal bonds one gets 80 by 8%

♦ Then the actual return will be more

The tax exemption arises relative on muncipal bonds and shifts to the right and treasury bond market shifts to the left.

2.10 MANAGING BOND PORTFOLIO: BOND IMMUNIZATION

Q22. How do you manage bond portfolio? Explain the concept of bond immunization with reference to the managing bond portfolio.

Answer :

Managing Bond Portfolio

Managing bond portfolio is a difficult task for an investor. However, effective management of bond portfolio provide good results and returns to investors.

For remaining answer refer Unit-II, Page No. 2.26, Q No. 18

Bond Immunization

Interest rate risk is of real concern for bond investor. A change in interest rate has two effects, name y, reinvestment effect and price effect. If the interest rate moves up after the purchase of the bond, interest income from the bond will be reinvested at a higher rate and so interest earned on reinvestment of interest will be higher.

But rise in interest rate reduces the bond's price and hence investor increases a capital loss. Thus, a rise in interest rate has a positive effect and a negative effect also. The strategy of an investor to protect themselves from interest rate risk is referred to as bond immunization.

Immunization is a technique that makes the bond holder to be relatively certain about the promised stream of cash flows. The opposite effect of coupon rate risk and the price risk can be made to off-set each other.

The coupon amount can be reinvested in the bonds offering higher interest rate and losses that occur due to fall in the price of bond can be offset and bond is said to be immunized. In a nut shell, immunization is the process of constructing bond portfolio, so that, the realized return will always be at least equal to the promised return.

Factors Influencing Bond Immunization

Immunization offers complete protection against interest rate risk only if the following conditions exist,

(a) The investment is made in a default free bond or portfolio of bonds.

(b) The buy and hold strategy is adopted.

(c) There is only a time change in interest rate during the investment horizon.

(d) The term structure s flat.

(e) The duration of a bond or portfolio of bond is matched with the investment horizon.

PROBLEMS ON BOND IMMUNIZATION

1. **The data corporation must pay ₹25 lakhs at the end of each of the next two years. Bonds are currently yielding 12%.**

    (a) **What is the present value and MD of this liability?**

    (b) **What maturity zero coupon bond would immunize this portfolio? Also determine its face value.**

Solution :

(a) **Present Value and MD**

Year (n)	Liability (₹lakhs)	PVF @ 12%	PV of liability	Proportion of P_0 (W$_i$)	n × W$_i$
1	25	0.8929	22.32	0.53	0.53
2	25	0.7972	19.93	0.47	1.00
			P_0 42.25		MD = 1.53

∴ Macaulay's duration = 1.53 Years

(b) In order to immunize the portfolio, a 12% zero coupon bond with a maturity of 1.53 years should be used. The face value of the zero coupon bond is as follows,

$$= P_0 \times (1 + YTM)^{1.53}$$
$$= 42.25 \times (1.12)^{1.53}$$
$$= 42.25 \times 1.1893$$
$$= ₹50.2479 \text{ lacs}$$

2. Ajay has ₹50,000 to make one time investment. His son has entered the higher secondary school and he needs his money back after two years for his son's educational expenses. As Ajay's outflow is one time outflow, duration is simply two years. Now he has a choice of two types of bonds.

   (a) Bond A has a coupon rate of 7% and maturity of four years with a current yield of 10%. Current price is ₹904.90.

   (b) Bond B has the coupon rate of 8%, a maturity of one year and current yield of 10%. The current price is ₹963.84.

   Suggest Ajay to form a fully immunized bond portfolio.

Solution :

The two bonds pose two types of risk to him. He can invest all his money in bond 'B' with the aim of reinvesting the proceeds from the maturing bonds into another issue of one year period.

If the interest rate declines in the market during the next year, he has to reinvest his money in low yielding bonds and may suffer from a loss. Now he has to face the reinvestment risk.

On the other hand, if he invests his money in 'A' bond, that also involves certain amount of risk. He cannot hold it till maturity, because he needs the money after two years and has to sell it in middle.

If there is a rise in the market interest rate, then the price of the bond will fall down and vice versa. If a rise in interest rate is assumed, the investor has to incur loss.

Ajay can solve the problem by investing part of the money in one year bonds and a part in four year bonds. The portion to be invested in each of these bonds can be calculated as follows,

$$(W_1 \times D_1) + (W_2 \times D_2) = 2$$

Where,

W_1 = Proportion of investment in bond A

W_2 = Proportion of investment in bond B

D_1 = Duration of bond A

D_2 = Duration of bond B

But, $D_2 = 1$ year (as it makes one time payment)

Calculation of Duration for Bond B

Year (n)	CFs	PVF @ 10%	PVs	Proportion (w)	n × w
1	70	0.9091	63.64	0.0703	0.0703
2	70	0.82654	57.85	0.0639	0.1278
3	70	0.7513	52.59	0.0581	0.1743
4	1070	0.6830	730.81	0.8076	3.2304
			P_0 = 904.89		D = 3.6028

$(W_1 \times 1) + (W_2 \times 3.6020) = 2$

But $W_1 + W_2 = 1$

$W_1 = 1 - W_2$

$[(1 - W_2) 1] + [W_2 \times 3.6020] = 2$

$1 - W_2 + 3.6020 \, W_2 = 2$

$W_2 = 0.434 = 43.4\%$

And $W_1 = 0.566 - 56.6\%$

So, Ajay should put 56.6% of his investible funds in one year bond and 43.4% in four year bond. Now, he needs ₹ 50000 after two years and therefore now he requires to invest.

$$x(FVF_{10\%, 2}) = ₹ 50000$$
$$x(1 + 0.10)^2 = 50000$$
$$x(1.21) = 50000$$
$$x = \frac{50000}{1.21} = ₹ 41322.31$$

The money to be invested in bond A,

$$W_1 \times x = 0.6158 \times 41322.31$$
$$= ₹ 23388.42$$

and money to be invested in bond B,

$$= W_2 \times x = 0.3842 \times 41322.31$$
$$= ₹ 17933.88$$

Ajay can purchase the following number of bonds,

$$Bond\ A = \frac{25446.28}{963.64} = 24.27 = 24\ bonds$$

$$Bond\ B = \frac{15876.03}{904.81} = 19.81 = 20\ bonds$$

2.11 BOND PORTFOLIO MANAGEMENT STRATEGIES: ACTIVE AND PASSIVE BOND

Q23. Describe briefly about the active and passive bond portfolio management strategies.

OR

Explain active and passive bond portfolio management strategies.

Answer :   Dec.-15, Q3(a)

Active Bond Portfolio Management Strategies

For answer refer Unit-II, Page No. 2.31, Q.No. 24.

Passive Bond Portfolio Management Strategies

For answer refer Unit-II, Page No. 2.32, Q.No. 25

2.11.1 Active Portfolio Strategies

Q24. How can horizon analysis be used to manage a bond portfolio?

OR

Describe various active portfolio strategies.

Answer :

Active Bond Management

Active bond management need to adopt more/enhanced investment strategies so as to attain effective bond portfolio. The prime objective is to expect appropriate interest rates as they tend to deviate frequently and tries to trace out the mispriced bonds thereby valuing them correctly.

Based on the estimations of interest rates, investors would be able to render specific durations for their investments. If the interest rates are high then duration assigned would be less and if the interest rates are reasonable then duration will be more. After identifying the mispriced bonds, investors would be able to recognize the bonds which have been underpriced and overpriced and hence can be valued correctly. However, fu filling these two object ves is a complicated activity and hence involves collection of accurate information and effective analysis which can be accomplished by adopting various investment strategies.

Strategies of Active Bond Management

The following are such investment strategies.

1.   Horizon Analysis

This is one of the efficient method to forecast interest rates. In horizon analysis, estimations are made with regard to reinvestment rates and future market yields based on which, the returns of various bonds are compared and evaluated for a specified time period to recognize.

2.   Bond Swaps

Bond swaps acts as an effective tool in assigning accurate values to the mispriced bonds. Bond portfolios managers initially identify the various bonds which are overpriced and underpriced. The bonds of underpriced are exchanged with the bonds of overpriced which ultimately enhances the investors rate of return. There are various types of bond swaps available and a best suited swap is applied to the bonds by considering the situation. Various bond swaps are explained here under,

(i)   Substitution Swap

In this swap, even though bonds posses identical characteristics their value differs while dealing in trading activities and hence exchanged for different values. Usually, this is done so as to create an imbalance between demand and supply and benefit from temporary price advantage.

(ii)   Pure Yield Pickup Swap

The purpose of this swap is to earn more returns by selecting long term bonds. If there exists any short term bonds, then even those bonds are transposed to long term bonds.

(iii)   Intermarket Spread Swap

In this swap, higher returns are earned by exchanging the bonds of various markets, as returns of one market would be different from other market.

(iv)   Rate Anticipation Swap

In this swap, profits are earned by observing the movement of the market and thereby anticipating the rate of return.

3. Contingent Immunization

Contingent immunization is applied as far as the portfolio is able to gain profitable returns. Once, if it is noticed that the profits are not proper then immediately portfolio would be safeguarded. Contingent immunization is applicable to both active and passive portfolio strategy.

4. Riding the Yield Curve

This method is applicable to the portfolio managers whose aim is to obtain liquidity and hence invest in short term fixed-income securities

Managers possess two ways. One way is to buy the securities, retain till the maturity date and again reinvest Another way is to ride the yield curve but it is subjected to certain conditions.

First constraint is that the yield curve should slope towards upward direction which implies that long term securities possess greater profits Second constraint is that, it is the belief of the investor that the yield curve would continue to slope in upward direction. Therefore, an investor by considering these two conditions, can purchase securities which possess long term duration and need to sell off before the duration period ends, which ultimately leads to obtain capital gains.

2.11.2 Passive Bond Portfolio Strategies

Q25. Identify and explain at least two passive bond management strategies.

OR

Discuss the passive strategies for managing a bond portfolio.

Answer :

Passive Bond Management

In a passive bond portfolio, investors do not try to participate actively in trading activities so as to perform better than the market This literally does not mean that the investors do not perform well Infact, most of the investors before expecting returns undergo a thorough analysis of all possible risk elements and based on it returns are expected. Moreover, they expect a little low returns to be protected from uncertain risk.

Eventhough, investors are not participating actively, they need to focus on the following essential elements,

(i)   Evaluate all types of risks and propagate the securities in a fair and sensible order.

(ii)   To balance risk and returns, portfolios are to be reviewed continuously.

(iii)   It is true that investors do not participate in market but in case if the changes in market conditions effect adversely to the portfolios of investors then they react accordingly towards the situation.

Strategies of Passive Bond Management

Investors opting passive bond management adhere to two categories.

1. Buy and Hold Strategy

In this strategy, an investor purchases the securities and just holds for a specified period of time and finally sells the securities. He neither takes part in trading process nor aims for higher returns. By applying this strategy, his risk would be less and returns are reasonable However, selecting an optimum portfolio is very essential, without which it is not possible to obtain reasonable returns. Therefore, any investor who wishes to adopt this strategy initially needs to possess a comprehensive knowledge subjected to various securities, a l types of risks and perfect timing. After obtaining extensive information, he would be able to select an appropriate portfolio, so as to achieve adequate returns.

2. Indexing Strategy

It has been reviewed in a survey that most of the investors do not wish to participate actively in market Moreover, if the investors portfolio is perfect then there is no need for the investors to underprice the securities or to possess a market timing. Therefore, investors can adopt an indexing strategy This strategy possesses two well-known bond indices, namely, Shearson Lehman Index and Salomon Brothers Index. In India I-BEX is the popular bond index.

PROBLEMS ON BOND PORTFOLIO MANAGEMENT STRATEGIES

1. Raju purchased at par a bond with a face value of ₹ 1000. The bond had five years to maturity and a 10% coupon rate. The bond was called two years later for price of ₹ 1200 after making its second interest payment. Raju then reinvested the proceeds in a bond selling at its face value of ₹ 1000 with three years to maturity and a 7% coupon rate. What was Raju's actual YTM over the five years?

Solution :

YTM can be Calculated Using Trial and Error Method

Year	CFs	PVIF@ 12%	PV$_b$	PVIF@ 14%	PV$_a$
1	100	0.893	89.30	0.877	87.70
2	1300	0.797	1036.10	0.769	999.70
2	(1000)	0.797	−797.00	0.769	−769.00
3	70	0.712	49.84	0.675	47.25
4	70	0.636	44.52	0.592	41.44
5	1070	0.567	606.69	0.519	555.33
			P$_b$ = 1029.45		P$_a$ = 962.42

Interpolation

$$YTM = 12 + \frac{29.45}{67.03} \times 2$$

$$= 12 + 0.878 = 12.88\%$$

Working Notes

(i) Cash Outflows

Purchase price of new bond = ₹ 1000

(ii) Cash Inflows

Year 1 Coupon amount = 10% of ₹ 1000 = ₹ 100

Year 2 Coupon amount + redemption amount

     100 + 1200 = ₹ 1300

Year 3. Coupon amount = 7% of ₹ 1000 = ₹ 70

Year 4. Coupon amount = 7% of ₹ 1000 = ₹ 70

Year 5 Coupon amount + Principal

     70 + 1000 = ₹ 1070

(iii) Interpolation

	YTM	P$_0$
Difference	2	67.03
Difference	?	29.45

P_0 at 12% = ₹ 1029.45

Actual P_0 = ₹ 1000.00

Difference : ₹ 29.45

P_0 at 12% = ₹ 1029.45

P_0 at 14% = ₹ 962.42

Difference = ₹ 67.03

2. **(a)** Determine the price of a ₹ 1000 zero coupon bond with a YTM of 16% and 10 years until maturity.

(b) What is the YTM of this bond if its price is ₹ 200?

Solution :

Rule :

No coupons are paid on zero coupon bond.

(a) **Price of Zero Coupon Bond**

$$= \frac{Face\ value}{(1+YTM)^n}$$

$$= \frac{1000}{(1+0.16)^{10}} = ₹226.68$$

(b) **Bond's Price**

$$= \frac{Face\ value}{(1+YTM)^{10}}$$

$$200 = \frac{1000}{(1+YTM)^{10}}$$

$$(1+YTM)10 = \frac{1000}{200}$$

$$1+YTM = 5^{1/10}$$

$$YTM - 1.1746 \quad 1 - 0.1746$$

$$= 17.46\%$$

3. **(a)** What is the Value of a ₹ 1000 bond that is paying $3\frac{1}{2}\%$ annual coupon rate in annual payments over 10 years until it matures if its YTM is 6%?

(b) What is the bond's present value, if coupons are paid semiannually?

Solution :

Given that,

$$C = 3\frac{1}{2}\% \text{ of Rs. } 1000 = ₹35$$

$$P_n = ₹1000$$

$$YTM = 6\%$$

(a) $P_0 = C(PVIFA_{6\%,\ 10}) + P_n(PVIF_{6\%,\ 10})$

$$= 35(7.360) + 1000(0.558)$$

$$= 257.60 + 558$$

$$= ₹815.60$$

(b) If coupon are paid semiannually,

$$C = \frac{35}{2} = ₹17.50$$

$$YTM = \frac{6}{2} = 3\%$$

$$n = 10 × 2 = 20 \text{ periods}$$

$$P_0 = C(PVIFA_{3\%,\ 20}) + P_n(PVIF_{3\%,\ 20})$$

$$= 17.50(14.877) + 1000(0.554)$$

$$= 260.35 + 554$$

$$= ₹814.35$$

4. A ₹ 100 par value bond bearing a coupon rate of 11% matures after 5 years. The expected yield to maturity is 15%. The present market price is ₹ 82. Can the investor buy it.

Solution :

Calculation of Bond's Price

$$P_0 = C(PVIFA_{15\%,\ 5}) + P_n(PVIF_{15\%,\ 5})$$

$$= 11(3.3522) + 100(0.4972)$$

$$- 36.87 \quad 49.72 - ₹86.59$$

$$NVP = PVCIF_S \quad PVCOF_S$$

$$= 86.59 - 82 = ₹4.59$$

The NPV is higher i.e., the market value is lower than the calculated value and hence the bond is underpriced. Therefore, the investor can buy the bond.

5. Arjun, consider ₹ 1000 par value bond bearing a coupon rate of 11% that matures after 5 years. He wants a minimum yield to maturity of 15%. The bond is currently sold at ₹ 870. Should he buy the bond.

OR

Arvind considers ₹ 1000 par value bond bearing a coupon rate of 11% that matures after 5 years. He wants a minimum yield to maturing of 15%. The bond is currently sold at ₹ 870/-. Should he buy the bond?

Solution : *April-15, Q3(b)*

[Note: Instead of Arvind, Arjun is given in the problem]

$$P_0 = C(PVIFA_{15\%,\ 5}) + P_n(PVIF_{15\%,\ 5})$$

$$= 110(3.3522) + 1000(0.4972)$$

$$= 368.74 + 497.20 = ₹865.94$$

$$NVP = PVCIF_S \quad PVCOF_S$$

$$= 865.94 \quad 870$$

$$4.06$$

The NPV at Arjun's anticipated is negative i.e., the current market price is higher than the calculated price, and hence the bond is over priced. Therefore, he should not buy

6. The Madsoft Company recently issued a ₹ 1000, 12% semiannual bond with 20 years of maturity (a) What will be the price of the bond, if the market rate of interest is 14%? (b) Determine the bond's Macaulay's duration when it was issued and (c) Two years later.

Solution :

(a) Bond Price

Annual coupon $= 12\%$ of ₹ 1000

$= ₹ 120$

Semiannual coupon $= \dfrac{120}{2} = ₹ 60$

Semiannual YTM $= \dfrac{14}{2} = 7\%$

No. of periods $= 20 \times 2 = 40$

$P_0 = C(PVIFA_{7\%,\ 40}) + P_n(PVIF_{7\%,\ 40})$

$= 60(13.3317) + 1000(0.0668)$

$= 799.90 + 66.80 = ₹ 866.70$

(b) MD

$$MD \frac{C\left[(z)^{n \times (m+1)} \cdot z - (YTM)(m)\right] + (P_n)(n)(m)\left(\dfrac{YTM}{m}\right)^2}{C\left(\dfrac{YTM}{m}\right)\left[(z)^{n \times m} - 1\right] + P_n\left(\dfrac{YTM}{m}\right)}$$

Where,

C = Coupon per period

n = Number of years until maturity

m = Number of compounding periods in a year

P_n = Face value

YTM = Yield to maturity per period

$Z = \left(\dfrac{1+YTM}{m}\right)$

Here, YTM $= 0.14$

$n = 20$

$m = 2$

$P_n = 1000$

$Z = 1 + \dfrac{0.14}{2} = 1 + 0.07 = 1.07$

$C = ₹ 60$

$\therefore \quad MD = \dfrac{60[1.07^{41} \cdot 1.07 \cdot 2.8] + (1000)(20)(2)(0.0049)}{60(0.07)[1.07^{40} - 1] + (1000)(0.0049)}$

$= 14.548$ semiannual periods or 7.274 years

(c) Two years after issue, the duration is

$MD = \dfrac{60[(1.07)^{17} \cdot 1.07 - 2.52] + (1000)(18)(2)(0.0049)}{60(0.07)[(1.07)^{36} - 1] + (1000)(0.0049)}$

$= 14.264$ semiannual periods

$= 7.132$ years

---

7. Mr. Parthik will be making a car payment of ₹ 316 per month for the next 4 years. If the rate of interest on his loan is 1% per month, what is the duration of the loan?

Solution :

$YTM = 0.01 \times 12 = 0.12$

$C = ₹ 316$

$n = 4$

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$$P_a = 0$$

$$m = 12$$

$$\therefore \quad Z = 1 + \frac{0.12}{12}$$

$$= 1 + 0.01 = 1.01$$

$$MD = \frac{C[(z)^{n\times m+1} - z - (YTM)(n) + (P_a)(n)(m)\left(\dfrac{YTM}{m}\right)^2]}{C\left(\dfrac{YTM}{m}\right)[(z)^{n\times m} - 1] + P_a\left(\dfrac{YTM}{m}\right)^2}$$

$$MD = \frac{316 \; [1.01^{48} - 1.01 - (0.12)(40] + (0)(4)(12)(0.01)^2}{(316)(0.01)[1.01^{48} - 1] + (0)(0.01)^2}$$

$$= 22.596 \; \text{months} = 1.883 \; \text{years}$$

8. Calculate Macaulay's duration for the following semiannual bonds,

Bond	Face value (₹)	Coupon (%)	Time to Maturity (yrs)	YTM (%)
Q	1000	12	18	12
R	1000	16	20	14
S	1000	0	15	12
T	1000	14	17	16

Solution :

Calculation of MD

Bond	P_a (₹)	C (₹)	YTM	n (yrs)	m	MD (yrs)
Q	1000	60	0.12	18	2	7.67
R	1000	80	0.14	20	2	7.02
S	1000	0	0.12	15	2	15.00
T	1000	70	0.15	17	2	6.62

Working Notes

$$MD = \frac{C[(z)^{n\times m+1} - z - (YTM)(n)] + (P_a)(n)(m)\left(\dfrac{YTM}{m}\right)^2}{C\left(\dfrac{YTM}{m}\right)[(z)^{n\times m} - 1] + P_a\left(\dfrac{YTM}{m}\right)^2}$$

$$MD_Q = \frac{60[1.06^{37} - 1.06 - 2.16] + 1000(18)(2)(0.06)^2}{60(0.06)[1.06^{36} - 1] + 1000(0.06)^2}$$

$$= 7.75$$

$$Z = 1 + \frac{0.12}{2} = 1 + 0.06$$

$$= 1.06$$

And similarly for R, S and T

9. A ₹ 100 bond with a coupon rate of 12%, 20 years to maturity has a 10 year call deferment after which the bonds are callable at ₹ 110. N the current price is ₹ 96. Compute the approximate yield to call and approximate yield to maturity. Assume that interest payments are made semiannually.

Solution :

Given that,

$$P_a = ₹ 100$$

P_c (for call) = ₹ 1.0

Current P_0 = ₹ 96.00

Coupon payment, C = 12% of 100 × $\dfrac{1}{2}$

$\quad\quad\quad$ = ₹ 6.00 (per 6 month period)

Term to maturity, n = 20 years = 40 half-year periods

Term to first call, n_c = 10 years = 20 half-year periods

$$AYFC = \dfrac{2C + \dfrac{P_c - P_0}{n_c}}{\dfrac{P_c + P_0}{2}} = \dfrac{2(6) + \dfrac{110 - 96}{10}}{\dfrac{110 + 96}{2}}$$

$$= \dfrac{12 + 1.4}{103} = \dfrac{13.4}{103} = 0.1301 = 13.01\%$$

$$ATYM = \dfrac{2C + P_c - P_0}{\dfrac{P_c + P_0}{2}} = \dfrac{12 + \dfrac{100-96}{20}}{\dfrac{100 + 96}{2}}$$

$$= \dfrac{12 + 0.2}{98} = \dfrac{12.2}{98} = 0.1245 = 12.45\%$$

10. Determine Macaulay's Duration of a bond which has a face value of ₹ 1000 and 8% annual rate and 4 years to go for maturity. The bonds YTM is 10%. What is its Modified MD?

OR

Determine Macaulay's duration of a bond that has a face value of ₹ 1,000, an 8 percent coupon rate, and 4 years until maturity. The bond's YTM is 10 percent. What is the modified c for this method?

Solution :

Year (n)	Cash flow	PVIF @ 10%	PVs proportion (w_i)	PV of CF as	$n \times w_i$
1	80	0.9091	72.73	0.0777	0.0777
2	80	0.82654	66.11	0.0705	0.1412
3	80	0.7513	60.10	0.0642	0.1926
4	1080	0.6830	737.64	0.7876	3.1504
			P_0 =936.58		MD = 3.5619

$$MMD = \dfrac{MD}{1 + YTM} = \dfrac{3.5619}{1 + 0.10}$$

$$= \dfrac{3.56}{1.10} = 3.23 \text{ years}$$

11. Consider the data given below,

Current market price of a bond, P_0 = 102

Coupon rate, r = 15%

Maturity, n = 20 year

The bond is callable in five years at ₹ 111. The general expectation is that interest rates will downward trend in a near future. Compute,

(i) YTM

(ii) YTC

(iii) Of these two measures, which is more important for an investor in decision making p Explain the rationale.

Solution :

Given that,

1. $C = ₹ 7.5 \left(\frac{15}{100} \times 100 \times \frac{1}{2} \right)$, $P_0 = 102$

    $2n = 40$ periods, $P_v = ₹ 100$

(i) **Calculation of YTM for Semiannual Period**

At 6%

$P_0 = 7.5. PVIFA_{6\%, 40} + 100(PVIF_{6\%, 40})$

$7.5 (15.0463) + 100(0.0972)$

$112.85 + 9.72$

$= ₹ 122.57$

At 8%

$P_0 = 7.5. PVIFA_{8\%, 40} + 100(PVIF_{8\%, 40})$

$= 7.5 (11.9246) + 100(0.0460)$

$= 89.43 + 4.60$

$= ₹ 94.03$

By Interpolation

$YTM = 6\% + \frac{20.57}{28.54} \times 2$

$= 6\% + 1.44\%$

$= 7.44\%$ semiannually

or 14.8% annually

2. Given that

$P_0 = ₹ 102$

$P_v = ₹ 111$

$2n = 2 \times 5 = 10$

(ii) **Calculation of YTC for Semiannual Period**

At 6%,

$P_0 = 7.5(PVIFA_{6\%, 10}) + 111(PVIF_{6\%, 10})$

$= 7.5(7.3601) + 111(0.5584)$

$= 55.20 + 61.98 = ₹ 117.18$

At 8%,

$P_0 = 7.5(6.7101) + 111(0.4632)$

$= 50.33 + 51.42$

$= ₹ 101.75$

By Interpolation

$YTC = 6\% + \frac{15.18}{15.43} \times 2$

$= 6\% + 1.97\%$

$= 7.97\%$ semiannually or 15.94% annually

(iii) The yield to call is a better measure, since interest rates are expected to fall and hence calls on high coupon bonds can be expected.

SHORT QUESTIONS AND ANSWERS

Q1. What are Doji candle stick and deep discount bonds?

OR

Doji Candle Stick *May/June-16, Q1(c)*

(Refer Only Topic: Doji Candle Stick)

OR

Deep Discount Bonds

(Refer Only Topic: Deep Discount Bonds (DDB))

Answer : *(Model Paper-II, Q1 | May/June-16, Q1(d) | April-15, Q1(d) | May/June-12, Q1(g))*

Doji Candle Stick

A doji candle is one in which both the opening price and closing price are same to one another. It can be used for singular and plural. Dojies are considered as neutral, patterns and indications depend on the preceding price and future confirmation. In case doji appears in a bull market, then doji with a long upper shadow and short lower shadow indicates bearish trend. If it occurs in a bearish market, then doji with a short upper and long lower shadows indicate bullish trend.

Figure: Doji Candle Stick

Deep Discount Bonds (DDB)

DDB is a debt instrument which is issued by financial institutions. DDBs possess issue price and face value. On the date of maturity, the holder receives this issue price and face value. At the maturity time, as DDB possesses only one future cash flow, it needs to be equated to the present value and discounted at the investor's required rate of return.

Q2. What do you mean by bond convexity, AYTM and YTC?

OR

Bond Convexity *Dec.-15, Q1(c)*

(Refer Only Topic: Bond Convexity)

OR

AYTM and YTC

(Refer Only Topics: AYTM, YTC)

Answer : *Dec.-15, Q1(d)*

Bond Convexity

Price of a bond and its yield are inversely relative. The rise in bond price would cause a fall in yield and vice-versa. This has been proved in theorem 1 of bond price theorem. According to theorem 4, the relationship is not linear.

The quantum increase in the bond's price for a given decline in the yield is higher than the decline in bond's price for a similar amount of increase in bond's yield. Hence relationship is not linear. This relationship is often referred to as convexity and it measures the sensitivity between them.

The concept of convexity is applicable to all types of bonds. The degree of convexity differs from bond to bond depending upon the size of the bond, the years to maturity and the current market price.

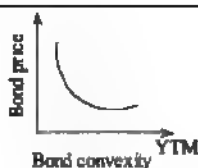**SIA PUBLISHERS AND DISTRIBUTORS PVT. LTD.**

Figure: Bond Convexity

AYTM

Many investors do not bother to calculate the YTM, and instead analyze the return earned in a very simple way. The reason is that the total return consists of interest payment and the capital gain/loss on redemption.

Similarly, the average investment is equal to half the redemption price and purchase price. Therefore, the annual return calculated based on these approximation is called as 'Approximate YTM'. The formula for approximate YTM is as follows,

$$AYTM = \frac{C + \left[\frac{(P_n - P_0)}{n}\right]}{\frac{(P_N + P_0)}{2}}$$

Where,

C = Coupon amount

P_n = Face value

P_0 = Market value (redemption value)

n = Maturity period

YTC

Sometimes, issuer of a bond has the option to call (or redeem) to bond before it reaches maturity. This is likely to occur when the coupon interest rate on similar new bonds is substantially the coupon interest rate on similar new bonds is substantially below the coupon interest on existing bonds because the corporation can save money on future interest payment and on such callable bonds, the discount rate that equates the present value of the cashflow to first call of a callable bond to its market value can be termed as yield-to-call

Q3.　HPR and YTM　　　　　　　　　　　　　　　　　　*(Model Paper-1, Q3　April-15, Q1(c))*

OR

Yield to Maturity (YTM)　　　　　　　　　　　　　　　*Dec.-14, Q1(c)*

(Refer Only Topic: YTM)

OR

Holding Period Return

(Refer Only Topic. HPR)

Answer :　　　　　　　　　　　　　　　　　　　　　　*May/June-13, Q1(d)*

HPR

An investor buys a bond and sells it after holding for a period. The rate of return in that holding period is calculated as follows,

$$\text{Holding Period Return} = \frac{\text{Price Change} + \text{Coupon Interest (if any)}}{\text{Price at the beginning of the holding period}}$$

The holding period rate of return is also called as the one period rate of return. The holding period return can be calculated daily or monthly or annually. If the fall in the bond is greater than the coupon payments, then the holding period return with turn to negative.

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YTM

The concept of Yield to Maturity (YTM) is one of the widely used tools in bond investment management. The current way of computing the return on any asset involves considering the entire sequence of cash flows with their timing and calculating the internal rate of return.

In case of a bond, there is a cash outflow (equal to the price of the bond) when the bond is bought but there are cash inflows, when the periodic interest coupons are received, another cash inflow is the redemption value is received on maturity

Calculating the IRR of these streams of cash flows gives the true return on the bond which is known as the Yield to Maturity (YTM)

Therefore, YTM is the single discount factor that makes present value of future cash flows from bond equal to the current price of the bond. To find out the yield to maturity, present value technique is adopted. The formula is,

Present value,

$$= \frac{\text{Coupon}_1}{(1+y)^1} + \frac{\text{Coupon}_2}{(1+y)^2} + \dots + \frac{(\text{Coupon}_n + \text{Face value})}{(1+y)^n}$$

or $P_0 = C(PVIFA_{y,n}) + F(PVIF_{y,n})$

and here $y = YTM$

Q4. What is bond duration and bond immunization?

OR

Bond Duration *(Model Paper-III, Q4 | Dec.-14, Q1(d))*

(Refer Only Topic: Bond Duration)

OR

Bond Immunization

(Refer Only Topic: Bond Immunization)

Answer :   *(April/May-14, Q1(e) | May/June-13, Q1(f))*

Bond Duration

A measure of the average maturity of the stream of payments generated by a financial asset. Mathematically, duration is the weighted average of the lengths of time until the asset's remaining payments are made. The weights in this calculation are the proportion of the assets total present value represented by the present value of the respective cash flows.

Bond Immunization

Immunization is the process of constructing a bond portfolio, so that the realized return will always at least equal the promised return. It is used as a strategy by investors to protect themselves from risk A technique that makes the bond holder to be relatively certain about the promised stream of cash flows. The opposite effect of coupon rate risk and price risk can be made to off-set each other.

Q5. Types of Debt Securities

Answer :   *April/May-14, Q1(d)*

The various type of debt instruments/securities are as follows,

1. Bonds
2. Debentures
3. Commercial papers
4. Certificate of deposit
5. Government securities
6. Amortized loans
7. Installment loans
8. Interest only debt
9. Mortgages
10. Letter of credit (L/C)
11. Callable debt
12. Convertible debt
13. Industrial revenue bonds.

Q6. State features of debt securities.

Answer :   *Dec.-13, Q1(c)*

Some of the basic characteristic features of a debt instruments are as follows,

(i) Interest Rates or Coupon Rates

Interest rate or rate of interest is also known as 'coupon rate' Usually, debt instruments consists of a promise made by a borrower to pay a certain amount of interest at periodic intervals to the registered holder In certain cases the borrower does not make any promise to pay interest to the registered holder or debenture holder Debt instruments without any promise to pay interest are called as "zero coupon bonds"

(ii) Maturity Date

Each and every debt instrument holds the maturity date The debt amount is repaid on maturity date.

(iii) Face Value and Redemption Value

All the debt instruments holds both the face value and the maturity value Usually, the maturity value is equal to the face value But in certain cases the maturity value might not be equal to the face value, while in few other cases the bond securities are repaid by converting them into equity shares.

(iv) Credit Instrument

Debt instrument is a kind of a loan. In case of debt instruments, debenture holder is a creditor and the borrowing company is a debtor. Borrowing company is liable to pay interest amount and the principal amount to the debenture holder Apart from receiving the interest amount and principal amount, the debenture holder also enjoys some more rights.

(v)   Collateral

Debt issued might be either secured or unsecured one's, so debentures or other similar kind of securities issued might be termed as "secured debentures" or "unsecured debentures".

Q7   How to determine bond duration?

Answer :   *Dec.-13, Q1(d)*

Duration measures the time structure of a bond and the bond's interest rate risk. The common way to state is how many years he has to wait until the bond matures and the principal money is paid back.

This weight average of time periods to maturity, weights being present values of the cash flow in each time period. The formula for duration is,

$$D = \frac{C_1}{\frac{(1+r)}{P_0}} + \frac{C_2}{\frac{(1+r)^2}{P_0}} + \cdots + \frac{C_t}{\frac{(1+r)^t}{P_0}} \times T$$

This can be summarized as,

$$D = \sum_{i=1}^{T} \frac{P_v(C_t)}{P_0} \times t$$

Where,

   D = Duration

   C = Cash flow

   r = Current yield to maturity

   T = Number of years

   $P_v(C)$ = Present value of the cash flow

   P_0 = Sum of the present values of cash flow

Q8.   State types of Bonds.

Answer :   *Dec. 12/Jan. 11, Q1(c)*

A bond is a marketable and legal contract which promises to pay interest as well as principal amount at a specified date. The different types of bonds are as follows,

   (i)   Convertible bonds

   (ii)   Non-convertible bonds

   (iii) Collateral trust bonds

   (iv)   Sinking fund bonds

   (v)   Mortgage bonds

   (vi)   Participating bonds

   (vii) Serial bonds

   (viii) Redeemable bonds

   (ix)   Irredeemable bonds

   (x)   Income bonds.

EXERCISE PROBLEMS

1   A 11.5% bond of face value ₹ 1,000 is currently traded at ₹ 1,180. It can be called at any time after 3 years at a price of ₹ 1,090. Find out the yield to call by approx. YTM method.

(Ans: Approx. YTC is 7.43%).

2. A 14% bond (FV ₹ 1,000) is currently traded for ₹ 1,050. Maturity period is 5 years. Find out the YTM as per basic valuation model and approximate YTM method.

(Ans: 12.60% and 12.82%).

3. An investor buys for ₹ 1,063, a 10% bond with a face value of ₹ 1,000. The bond is called by the company two years later at a price of ₹ 1,200 after paying second coupon. The proceeds were immediately used to buy a 12% bond

(FV = ₹ 1,000) with redemption value of ₹ 1,100 after 2 years. Find out the rate of return earned by him over investment period of 4 years.

(Ans: YTM = 11%)

(Hint : ₹ 1,063 = (₹ 100 × PVAF$_{(11, 2)}$) + (₹ 120 × PVF$_{(11, 3)}$) + (₹ 120 × PVF$_{(11, 4)}$) + (₹ 1,100 × PVF$_{(11, 4)}$)).

4   A bond has a YTM of 10% and its duration is 8 years. The YTM of the bond is expected to go down by 75 basis points (from 10% to 9.25%). Find out the modified duration and the percentage change in bond price.

(Ans: Modified duration is 7.62 years and percentage increase in price is 5.72%).

5   Consider a ₹ 100 par value bond, carrying a coupon rate of 12 percent and maturity after 6 years. The bond is currently selling for ₹ 110. What is the YTM on this bond? What is duration of the bond?

(Ans: YTM = 9.75%, Duration = 4.665 years).

6   Consider a ₹ 1000 par value bond, carrying an interest rate of 15 percent (payable annually) and maturity after 5 years. The present market price of this bond is 16 percent. Find the future value of bond

(Ans: Total Future Value = ₹ 2,032).

7   A ₹ 100 par value bond bears a coupon rate of 14 percent and matures after five years. Interest is payable semi-annually. Compute the value of the bond if the required rate of return is 16 percent.

(Ans: Value of the bond ₹ 93.27).

INTERNAL ASSESSMENT

I.   **Multiple Choice**

1   The fixed income securities available in India are _____   [   ]

   (a) Bank deposits   (b) Company deposits

   (c) Small saving schemes   (d) All of the above

2.   A short term instrument of raising funds by corporate is _____.   [   ]

   (a) Commercial paper   (b) Certificate of deposit

   (c) Debentures   (d) Bonds

3   The value of bonds depends upon the following factors _____   [   ]

   (a) Coupon rate   (b) Expected yield to maturity

   (c) Both (a) and (b)   (d) Yield to call

4.   The relationship between bond price and yield which measures the sensitivity between them is _____

                                                                                                    [   ]

   (a) Bond duration   (b) Bond convexity

   (c) Bond indenture   (d) Bond immunization

5.   Which of the following are termed structure theories?   [   ]

   (a) Preferred habitat theory   (b)   Segmentated market theory

   (c) Liquidity preference theory   (d) All the above

6.   Bond portfolio management strategies are _____ .   [   ]

   (a) Active bond management   (b) Passive bond management

   (c) Both (a) and (b)   (d) Direct bond management

7   This swap is to earn more returns by selecting long term bonds"   [   ]

   (a) Pure yield pickup swap   (b) Intermarket spread swap

   (c) Substitution swap   (d) Rate anticipation swap

8   This bond is said to be fairly priced when _____.   [   ]

   (a) YTM > AYTM   (b) YTM = AYTM

   (c) YTM < AYTM   (d) None of the above

9.   In valuation of optionally convertible debentures, debenturesholder exclusively posses the option of _____

                                                                                                    [   ]

   (a) Continue as debenture holder   (b) Choosing for conversion

   (c) Both (a) and (b)   (d) Selling of debentures

10. The model developed by Macaulay's duration is also known as _____.   [   ]

   (a) Permanent model   (b) Temporary model

   (c) Fixed model   (d) Continuous model

II.   Fill in the Blanks

1.   Securities which earns interest or dividend at fixed rate for a stipulated period of time are _____

2.   _____ is a contract between bondholders and bond issuers which is certain right and regulations to both the parties.

3.   The percentage return that the investor will receive is _____

4.   _____ is the process of determining the bond values.

5.   Bond duration measures _____ and _____ of the bond.

6.   _____ is a technique that makes the bond holder relatively certain about the promised stream of cash flows.

7.   An effective tool in assigning accurate values to the mispriced bonds is _____

8.   Indexing strategy possess two well-known bond indices namely_____ and _____

9   _____ is a process of holding a well diversified portfolio for a long term with the buy and hold approach.

10.   Liquidity preference theory = _____

KEY

1.   Multiple Choice

1.   (d)

2   (a)

3   (c)

4   (b)

5.   (d)

6.   (c)

7   (a)

8.   (b)

9   (c)

10.   (d)

II.   Fill in the Blanks

1.   Fixed income securities

2.   Bond indenture

3.   Bond yield

4.   Bond valuation

5.   Time structure and interest rate risk

6.   Immunization

7   Bond swaps

8.   Shearson lehman index and Salomon brothers index

9   Passive management

10.   Expectation theory + Liquidity risk premiums.

III.   Very Short Questions and Answers

Q1.   What is a Bond?

Answer :

A bond is a marketable, legal contract that promises to pay whoever owns it a predetermined rate of interest for a defined period, and then repay the principal at the specific date of maturity.

Q2.   What do you mean by Face Value?

Answer :

The face value or nominal value of the bond can be thought of as the principal amount on which interest is paid by the issues. In many cases, this is also the amount which is repaid at the end of the life of the bond. This is also often the price at which the bond is originally issued by the issuer. But, there are exceptions to both of these as explained subsequently.

Q3.   What is Bond Price?

Answer :

The price of a bond in the market is often expressed as a percentage of face value. It refers to the market price of the bond at the time of its maturity. If it exceeds the face value of the bond. Then investor is said to be have gained profit.

Q4.   Define Debenture.

Answer :

Section 2(12) of the Companies Act, 1956 defines debenture as follows, "debenture includes debenture, stock, bonds and any other securities of a company, whether constituting a charge on the assets of the company or not". Debenture is a document which either creates a debt or acknowledges it and any documents which fulfills either of these conditions is a debenture.

Q5.   What is a Zero Coupon Bond?

Answer :

A bond that promises to make only one payment to its owner is called as zero coupon bonds. This bond has no coupon payment and that single payment accrues at maturity only. It will be sold at a discount to face value and will be more volatile than a coupon carrying bond of the same maturity or yield.

UNIT
3

Common Stocks – Analysis and Valuation

<div align="center">

LEARNING OBJECTIVES

</div>

After studying this unit, one would be able to understand,

♦ The Meaning of Common Stock and its Features/Characteristics.

♦ Various Approaches to Valuation - Balance Sheet Model, Dividend Capitalization Models, Earnings Capitalization Models.

♦ Concept of Price - Earnings Multiplex Approach and Determinants of P/E Ratio.

♦ Concept of Capital Asset Pricing Model and Free Cash Flow Model.

♦ The Relative Valuation using Comparables - P/E, P/BV, P/S.

♦ Concept of Security Market Indexes and their Uses.

♦ The Procedure of Computation of SENSEX and NIFTY.

<div align="center">

INTRODUCTION

</div>

Common stocks acts as a power to the entire stock market. Any person before investing in common stocks, initially need to analyse his/her capability of resisting the risk. Because, if a person is able to bear high risk then returns would be high and if the risk is low then returns would also be minimum.

Equity shares are quite easier to be explained than the fixed income securities, but it is quite difficult to be ascertained. The fundamental principles of evaluating the equity shares is similar to the fixed income securities, valuation. In case of equity shares, the factors relating to growth and risk results in greater complexities. The approaches which are used in the fundamental equity valuation are classified into three categories i.e., Balance Sheet Techniques which involves Book value, Liquidation value and Replacement cost, Discounted Cash Flow Techniques involves dividend discount model and free cash flow model. Relative valuation techniques involves price-earnings ratio, price-book value ratio and price sales ratio.

A securities market index represents the performance of the market and ascertains the mean (average) value of a several securities which are selected as a sample which represents the behaviour of general market. Indexes are mainly developed to provide the in-depth, independent and impartial and constant barometers of a board market.

3.1 BASIC FEATURES OF COMMON STOCK

Q1. What do you understand by common stock? Explain the various features/characteristics of common stock.

Answer :

Common Stock

Common stocks acts as a power to the entire stock market. Any person before investing in common stocks, initially need to analyse his/her capability of resisting the risk. Because, if a person is able to bear high risk then returns would be high and if the risk is low then returns would also be minimum.

Hence, common stock is an authorised official document which confirms the ownership in an organisation. Investing in common stocks is a useful source for the investors who wish to acquire capital gains rather than current income.

Features/Characteristics of Common Stock

Following are the features/characteristics of common stock,

1.   Real Owners

The real owners of any company are the stockholders of common stocks.

2.   Residual Owners

Shareholders are usually termed as residual owners on the assets and income of the firm. Because common stockholders' earnings are in the form of dividends which they receive at last, unless and until the board of directors declare. Even, if a firm goes into liquidation, common stockholders acquire ownership on the firm's assets only after making payment to bondholders, creditors and preferred stockholders from the funds leftover. If the funds are not available then the organisation, need not to make any payment to common shareholders.

3.   Voting

Shareholders possess the right to vote in the firm's Annual General Meeting (AGM) on a specific matter that has to be discussed in AGM.

4.   Appointment

Shareholders appoints Board of Directors (BOD) through voting at the annual general meeting.

5.   Proxy Fight

Whenever shareholders are unable to attend the meeting to vote, then another person can vote on behalf of him. This process is usually termed as proxy.

6.   Board

Board do not meet frequently, instead appoints manager to look after the organisation on a daily basis. However, ownership is under shareholders.

7.   Reducing Agency Problems

Even though ownership is held by the shareholders, managers possess complete control. This could create agency problems. Therefore, appropriate steps have to be implemented to solve agency problems.

8.   Preemptive Rights

Preemptive right enables the stockholders to safeguard their proportions of ownership shares that were held by them earlier in order to carry forward the same proportion by the subscription of new shares. If a firm wishes to increase its capital then it has the option of selling the shares. First, it gives importance to existing shareholders which is termed as 'rights offering'. Interested shareholders would be purchasing the new shares and if the existing shareholders are not interested then they can sell their ratio of shares to people who wishes to buy i.e., shares which are not subscribed by the existing shareholders can be issued to public.

9.   Par Value

At the time of issuing shares to the investors, company creates an approximate value for a particular group of shares. This notional value allotted to a particular share is termed as par value.

10. Classified Common Stock

Common stock is classified in two types, Class-A and class-B. Class-A is offered to public whereas class-B is issued to management. Stock of class-A offers dividends to the public but they do not possess any voting rights. On the other hand, class-B renders management a right to vote but they are not liable to receive dividends. However, if the value of their shares are growing then they receive profits.

11. Cash Dividends

When stockholders receive certain amount in cash on a periodical basis then it is termed as cash dividends. Based on the requirements, organisations decide whether to declare dividends or not. Well known organisations and public organisations would like to declare dividends on a periodical basis. On the other hand, the organisation who wish to grow rapidly would not desire to pay dividends, rather they would like to reinvest maximum amount of funds so as to grow rapidly. From investors point of view, investors who wish to gain tax benefits from capital gains chooses the organisations with no cash dividends. And the investors like retired people wishes to get a periodical income preferable to well known or public organisations.

3.2 APPROACHES TO VALUATION

Q2. Explain various approaches of common stock valuation.

(Model Paper-I, Q4(a) | Dec.-13, Q4(a))

OR

Critically examine the various approaches to valuation of common stocks.

Answer : *April/May-09, Q4(a)*

The various approaches for valuation of common stock includes,

(i) Balance Sheet Model

For answer refer Unit-III, Page No. 3.3, Q No. 3.

(ii) Dividend Capitalization Models

For answer refer Unit-III, Page No. 3.4, Q No. 4.

(iii) Earning Capitalization Model

For answer refer Unit-III, Page No. 3.6, Q.No. 5.

3.2.1 Balance Sheet Model

Q3. Discuss the balance sheet model of the firm.

Answer :

The balance sheet shows the complete picture of the firm. It is an appropriate way of managing and summarizing the assets and liabilities of the firm and the differential amount between them at a given point of time. The diagramatic representation of the balance sheet helps in identifying the corporate finance in the following manner,
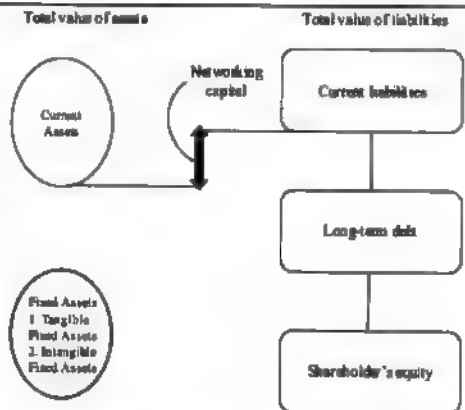
Figure: Balance Sheet Model of the Firm

Assets: The Left Hand Side

Assets are the properties of the organisations. They can be categorised into current or fixed assets. An asset with long life is known as fixed asset. Fixed assets are further divided into tangible assets like a computer or a machine and intangible assets like goodwill or trademark or patent. While on the other hand, an asset whose life-period is less than one year and which is easily converted into cash within a year is called as current asset. The examples of current assets are inventory (usually bought and sold within a year), cash, accounts receivable, etc.

Liabilities and Owner's Equity: The Right Hand Side

The first item recorded on the right hand side of the balance sheet is firm's liabilities. Firm's liabilities are basically divided into current or long-term liabilities. Similar to the current assets, there are current liabilities also whose life-period is less than a year and which are to be paid within a year and are recorded before long-term liabilities. Example of current liability is accounts payable (money which firm owes to its suppliers).

Long-term liability is defined a debt which is not due in the coming year i.e., the firm would be supposed to repay their loan in the coming five years. Usually, long-term debt and long-term creditors are referred to as bond and bond holders respectively. The difference of amount between the total value of the assets (i.e., both current and fixed) and the total value of the liabilities (i.e., both current and long-term) is called as shareholder's equity or common equity or the owner's equity. It implies that if firm sells off all its assets and makes use of the whole money for paying off the firm's debts then the residual value which is left over would belong to the shareholders. Therefore, the total sum of liabilities and shareholder's equity is equivalent to the total value of firm's assets. Thus it can be shown in an equation.

Assets = Liabilities + Shareholder's equity

Net Working Capital

Net working capital is the difference amount between the current assets and the current liabilities of the firm. When the current assets are more than current liabilities then it results into positive networking capital, and vice-versa. Depending on the meaning of current assets and current liabilities, it can be understood that the amount which is available after 12 months will be more than amount which is paid over during the same period. Therefore, firms with sound financial position usually holds a positive net working capital

3.2.2 Dividend Capitalisation Models

Q4. Write a detailed note regarding the dividend capitalization model for common stock valuation.

July-01, Q3(a)

OR

What do you mean by dividend capitalizations models? Explain the two stage growth model of common stock valuation.

Refer Only Topics: Dividend Capitalization Model, Two Stage Model)

Answer : *May/June-18, Q4(a)*

Dividend Capitalization Model

For an equity share, the payments are in the form of dividends, declared by the company

As the equity is a perpetual security i.e., with no maturity date, the dividend payments are made periodically through out its infinite life. So, the intrinsic value of a share is represented by the equation

$$P_0 = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \cdots + \frac{D_n}{(1+k_e)^t}$$

$$= \sum_{t=1}^{n} \frac{D_t}{(1+k_e)^t}$$

Where,

D_t = Dividend payment at time t

k_e = Equity capitalisation rate

P_0 = Present value of a share

Therefore, the value of an asset is the present value of all cash flow an investor expects from that asset and this approach is known as dividend capitalization model

Also known as capitalization of income method. The intrinsic value of an equity share depends on the dividends declared by the company. These models can be broadly classified into the following,

1. Single Period Valuation Models

These models assume the following,

(i) The dividends are paid annually.

(ii) The first dividend is received after one year and

(iii) The resale occurs at the end of the year

Then the price of the share is,

$$P_0 = \frac{D_1}{(1+k)} + \frac{P_1}{(1+k)} = \frac{D_1 + P_1}{(1+k)}$$

Where, P_0 = The current price

P_1 = Price after an year

D_1 = The dividend after a year

k = The required rate of return.

2. Two Stage Model

An investor would hold the security for more than one period. In that case the price of the share is given by the formula.

$$P_0 = \left(\sum_{t=1}^{n} \frac{D_t(1+g_1)^t}{(1+k)^t} \right) + \frac{D_n(1+g_2)}{(k-g_2)(1+k)^n}$$

Where,

D_n = Dividend per share in time period n

g_1 = Initial growth rate

g_2 = Longer run growth rate

n = Number of years that g_1 last.

3. Multiple Growth Model

Multiple growth model of dividends valuation is one of the dividend growth models which can be mostly used to value the stocks. In this model, dividends tend to grow at different growth rates for different time periods. In this model, Investor needs to estimate or forecast the dividend rate at a time in future (T) beyond this time period there will be a consistent growth in the dividends. The investor should also forecast the constant rate of dividend growth after a particular period of time in future.

The following equations represent the time durations and the growth rate of dividends in the multistage growth model,

$$D_{T+1} = D_T(1+g)$$
$$D_{T+2} = D_{T+1}(1+g) \text{ or } D_T(1+g)^2$$
$$D_{T+3} = D_{T+2}(1+g) \text{ or } D_T(1+g)^3$$

In multiple stage growth model, the value of the stock can be determined by,

$$P_0 = \left[\frac{D_1}{(1+k)^1} + \frac{D_2}{(1+k)^2} + \frac{D_3}{(1+k)^3} + \cdots + \frac{D_T}{(1+k)^T} + \frac{D_{T+1}}{(1-g)(1+k)^T} \right]$$

Where,

D_1 = Dividend rate for the first period

D_2 = Dividend rate for the second period

D_T = Dividend rate after 'T' time period

k = Cost of capital

g = Growth rate

In this model, there are three stages which includes stages

(i) Initial stage which is characterised by a stable high growth,

(ii) Transition stage wherein growth rate declines,

(iii) Final stage is characterised by a constant or sustainable growth rate of dividends.

4. Constant Growth Model of Dividend

With the progress of time, the dividend payments may increase i.e., $D_1 < D_2 < D_3$ and so on. So the price of the share under this phenomenon is,

$$P_0 = \frac{D_1}{k-g}$$

Where, P_0 = Price per share

D_1 = Dividend payment at time t

k = Expected rate of return

g = Growth rate.

This equation assumes a constant growth rate in dividend and hence is called as the constant growth dividend capitalization model.

PROBLEMS ON APPROACHES TO VALUATION

1. **X stock is currently selling at ₹ 30 per share, dividends expected is ₹ 2. Required rate of return is 15%. Calculate price after one year.**

Solution :

Current price, P_0 = ₹ 30

Expected dividend, D = ₹ 2

Expected rate of return, k = 0.15

We know that,

$$P_0 = \frac{D_1 + P_1}{1 + k}$$

$$30 = \frac{2 + P_1}{1 + 0.15}$$

$$P = 34.5 - 2$$

$$\therefore \quad P = ₹ 32.50$$

So, price of the share after one year would be ₹ 32.50

2. **The equity shares of a company currently sells for ₹ 22.50 per share. It has paid a dividend of ₹ 2.50 per share at the end of the year and the growth rate is 12%.**

(i) **What is the expected rate of return if the present purchases is ₹ 25?**

(ii) **If the investor require a 18 percent return, how much price he is willing to pay?**

Solution : *Dec.-13, Q4(b)*

(i) **Expected Rate of Return, if the Purchase Prices is ₹ 25**

Given that,

Price per share, P_0 = ₹ 25

Dividend payment at time t, D_1 = ₹ 2.50

Growth rate, g = 0.12

Expected rate of return K = ?

$$K = \frac{D_1}{P_0} + g$$

$$K = \frac{2.50}{25} + 0.12 = 0.22 \text{ or } 22\%$$

(ii) **If Required Return is 18%**

Given that,

$K = 0.18$

$$P_0 = \frac{D_1}{K - K}$$

$$P_0 = \frac{2.50}{0.18 - 0.12} = \frac{2.50}{0.06} = ₹ 41.67$$

As the price of the share with required return of 18% is greater than the current market price (i.e., ₹ 41.67 > ₹ 22.50), therefore investor should purchase the stock.

3. **The equity share of a company sells for ₹.23 per share and the anticipated growth rate in dividends is ₹10.5 percent. In the current year it has paid a dividend of ₹2.50 per share.**

(i) **What is the expected rate of return?**

(ii) **If the investor requires a 17% return, should he purchase the stock.**

Solution : *Dec.-12/Jan.-13, Q4(b)*

(i) **Expected Rate of Return**

Price of the share,

$$P_0 = \frac{D_1}{K - g}$$

Given that,

Price per share P_0 = ₹23

Dividend payment at time t D = ₹2.50

Growth rate, g = 0.105

Expected rate of return, K = ?

$$\therefore \quad P_0 = \frac{D_1}{K - g}$$

$$K - g = \frac{D_1}{P_0}$$

$$K = \frac{D_1}{P_0} + g$$

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$$K = \frac{2.50}{23} + 0.105$$

$$K = 21.36\%$$

(ii)   Should the Investor Purchase the Stock

Given, $K = 0.17$

$$P_0 = \frac{D_1}{K - g}$$

$$P_0 = \frac{2.50}{0.17 - 0.105}$$

$$= ₹ 38.46.$$

As the price of the share with required return of 17%, is greater than the current market price (i.e., ₹ 38.46 > ₹ 23), therefore investor should purchase the stock.

4.   The expected dividend per share is ₹ 2, which is likely to grow at the rate of 5%. If the required rate of return is 15%. Calculate price per share.

Solution :

Given that,

$$D_1 = ₹ 2$$

$$g = 0.05$$

$$k = 0.15$$

$$\therefore P_0 = \frac{D_1}{k - g} = \frac{2}{0.15 - 0.05} = \frac{2}{0.10} = 20$$

∴   Price per share is ₹ 20

3.2.3 Earnings Capitalization Models

Q5.   Explain valuation models namely the Gordan's model and the Walter's model.

Answer :

Valuation of equity shares can be determined in different ways based on the earnings of the company. Its various methods include,

❖   Gordon valuation model

❖   Walter's model

Gordon's Valuation Model

Gordon's model was developed by Myron Gordon. This model believes that dividends are relevant and dividend decision has an impact on firm value. Gordon supports Walter's model in analysis of relationship between dividend policy and valuation of firm. Gordon's model is based on following assumptions,

1.   It is assumed that firm is an all-equity firm and all investments are financed through retained earnings.

2.   It is assumed that firm has a perpetual life and there are no corporate taxes.

3.   The cost of capital is constant and more than the growth rate

4.   The internal rate of return remains constant.

5.   Firm decides a retention ratio and it remains constant

According to Gordon's model, the market value of the share is equal to the current value of future dividends. It can be mathematically represented as,

$$P = \frac{E(1 - b)}{K_e - br}$$

Where,

P = Market price of the share

K_e = Cost of capital

E = Earnings per share

b = Retention ratio

br = Growth rate

r = Earnings rate

Implications of Gordon Model

1.   When internal rate of return exceeds cost of capital (r>k) then price of the share increases and the dividend payout ratio decreases.

2.   When internal rate of return is same as cost of capital then dividend policy is not influenced and price of the share remains constant

3.   When internal rate of return is less than cost of capital (r < k) it leads to increase in both price of the share and also the dividend payout ratio.

Example

If earnings rate = 12%

Cost of capital = 8%

Value of share = ₹ 12 per share

If 60% is paid out as dividend.

Earnings per share = 0.12 × 12 = 1.44

b = retention ratio = 40%

K = 8%

$$P = \frac{E(1 - b)}{K_e - br}$$

$$= \frac{1.44(1 - 0.4)}{0.08 - (0.04 \times 0.12)}$$

$$= \frac{0.864}{0.032} = 27$$

The present value of share = ₹ 27

Limitations of Gordon Model

1.   This model is purely quantitative as it does not consider qualitative factors such as industry trends or trends in management strategy

2.   The Gordon growth model is highly sensitive to the inputs having an impact on growth rate

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3. If Gordon model is not used properly then it may generate misleading and irrational results. Due to the fact that value of dividends may becomes infinite when the growth rate converges on the discount rates.

4. This model is suitable only when growth rate is constant and if growth rate exceeds the required rate of return then Gordon model may not be suitable for the determination of value of dividends.

5. In Gordon model, calculations are based on the assumption that future dividends will grow at a constant rate forever.

6. This model is not suitable for rapidly growing industries which have less predictable dividend patterns.

When the Retention Ratio is Zero and 100% Earnings are Distributed as Dividends

Then value of r will be zero $i.e$, $er = 0$

$$P_0 = \frac{EPS_1(1-0)}{y_e - r_i}$$
$$= \frac{EPS_1}{y_e}$$ ... (b)

In case of equation (b), company hasn't retained any profits and furthermore, there is no new investment, as the retention ratio is zero. Hence, there exists no growth in the investment because of which further investment is not seen. Growth is not seen either in the earnings of the company or in dividends. Thus, value of the share is current EPS (or) current dividend capitalised at the desire rate of return of equity investors

Example

Suppose company's earnings per share ₹ 8 with zero retention ratio and distributes the entire earnings as dividends i.e., EPS = DPS. Then value of equity share is based on equation (b).

Solution :

Let the required rate of the return on equity investment be 16%

$$P_0 = EPS / y_e$$
$$= \frac{8}{0.16}$$
$$= ₹ 50$$
$$\therefore P_0 = ₹ 50$$

Example

ABC company has decided to distribute 50% of earnings as dividends and retain and reinvest remaining 50% of earnings at the ROI of 30%. Dividends per share expected at the end of 1st year is 50% of ₹ 10 i.e., ₹ 5 and the

growth rate in dividends i.e., br will be 0.5 × 0.3 = 0.15 and required rate of return of equity shares is 20% compute the value of equity share based on equation (a)

Solution :

$$P_0 = \frac{EPS_1(1 - br)}{y_e - r_i}$$

Given,

EPS = ₹ 5
$r_i = 0.5 \times 0.3 = 0.15$
$y_e = 20\%$
$$P_0 = \frac{5}{0.20 - 0.15} = ₹100$$

$\therefore$ Price of a share = ₹100.

From the above two examples value of equity share when there is no growth policy with 100% distribution of profits is found in the dividend rate of ₹ 50 and when there is a growth in the dividend rate of 50% retention is ₹ 100 the difference amount is ₹ 50 [₹ 100 – ₹ 50] and investor is ready to pay for the growth opportunities. Differential amount is also known as 'Present value of Growth Opportunities.'

When the Rate of Return of the Firm, i is equal to the Required Rate of Return of the Equity Investors,

y_e i.e., $y_e = i$

Under this case equation (a) is rewritten as,

$$P_0 = \frac{EPS_1(1 - r)}{y_e - y_e r}$$
$$P_0 = \frac{EPS_1(1 - r)}{y_e(1 - r)}$$
$$P_0 = \frac{EPS}{y_e}$$

Thus, assuming that retained profits are reinvested at the required rate-of-return i equally with the required rate of return of the investors. Finally, gordon's valuation model will become as represented in equation (b)

$$P_0 = \frac{EPS}{y_e}$$

Walter's Model

For answer refer Unit-III, Page No. 3.7, Q No. 6.

Q6. Discuss briefly about Walter's model with an example.

Answer :

Walter's Model

Walter's model believes that dividends are relevant because dividends influence the value of the firm. According to Walter, firm cannot be isolated from its dividend policy because they are associated with each other

The Walter's model is supported by important statements like there exists a relationship between internal rate of return (r) and cost of capital (k) which influence an optimum dividend policy of a firm. When internal rate of return is more than the cost of capital (r > k) then firm must preserve its earnings and when internal rate of return is less than cost of capital (r < k) then firm must distribute its earnings to shareholders as dividends. In the situation when r > k, the optimum pay out will be zero which results in increase in the value of the shares. And when r < k, the firm distributes all its earnings and optimum pay out will be 100%.

Assumptions of Walter's Model

1. Walter's model assumes that all the investments made by the firm are financed through retained earnings and not from any external sources of funds like debt or new equity.

2. It is assumed that business risk of the firm does not change which implies that internal rate of return and cost of capital remain constant.

3. It is assumed that firm is a going concern with perpetual life.

4. At the time of determining the value, earnings and dividends remains constant.

The formula for determining the market price of the share is,

$$P = \frac{D + \frac{r}{K_r}(E - D)}{K_r}$$

Where,

P = Market price of share

D = Dividend per share

r = Internal rate of return

K_r = Cost of capital

E = Earnings per share

Example

Earnings = 15 per share

Dividend paid = 5 per share

IRR = 30%

Cost of capital = 22%

What is the market price of the share?

$$P = \frac{5 + \frac{0.30}{0.22}(15 - 5)}{0.22}$$

$$= \frac{5 + 1.36(10)}{0.22} = \frac{18.6}{0.22} = 84.54$$

Criticism of Walter's Model

1. In Walter's model, all investments are financed through retained earnings which is possible only in all-equity firms.

2. The firm's cost of capital (K_c) remains constant is not acceptable. Since, pattern of financing changes, cost of capital also changes.

3. The internal rate of return remains constant is not possible in real world when investments of the firm increases, its internal rate of return changes.

3.3 PRICE - EARNINGS MULTIPLIER APPROACH (P/E RATIO)

Q7. What is price earnings multiplier approach? Explain the key determinants of the price earnings multiplier.

April/May-11, Q4(a)

OR

Explain the significance of P/E ratio in equity valuation.

(Refer Only Topic: Significance/Advantages of P/E Ratio)

Answer : *(Model Paper-II, Q4(a) | April-17, Q4(a))*

P/E Approach

Price-earnings ratios are used to estimate the value of the stocks by the investors rather than adopting the discounting models. Every financial magazine and the newspaper at regular interval publish price earnings per share.

Significance/Advantages of P/E Ratio

The P/E ratio models have three distinct advantages over the discounting models.

1. P/E ratios indicates price per rupee of share earnings. This would help to compare the prices of stocks, which have different earnings per share.

2. P/E ratios are helpful in analysing the stocks of the companies that do not pay dividend but have earnings. It should be noted that when there is a loss, the P/E ratio analysis is difficult to use.

3. The variables used in P/E ratio models are easier to estimate than the variables used in the discounting model.

We know that, by definition $D = E(1 - b)$, where D is dividend per share, E is earning per share and b is the earnings retention rate $[(1 - b)$ is the dividend payout ratio]. Therefore, an equivalent earnings based valuation model is,

$$P_0 = \frac{E_1(1 - b)}{k - g}$$

Where,

P_0 = Stocks present value

E_1 = Expected earnings at the end of year 1

b = Retention rate

g = Expected growth rate and

k = Required rate of return.

It is also true that $E_1 = E_0(1 + g)$, where E_0 is current earnings per share. The above equation can be stated in terms of P/E ratio as follows,

$$\frac{P_0}{E_0} = \frac{(1+g)\left(\dfrac{D_0}{E_0}\right)}{k-g}$$

Determinants of the P/E Ratio

Initially, estimated value of a stock need to be considered which is denoted as P and in terms of a constant growth of dividends discount model

$$P_0 = \frac{D_1}{k-g} \qquad ...(1)$$

Divide both sides of equation (1) with E_1, which is expected earnings of year 1

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k-g} \qquad ...(2)$$

P/E ratio depends on the factors present in equation (2). Where,

D_1/E = Expected dividend payout ratio

g = Expected growth rate of dividends

k = Required rate of return.

P/E ratio exists in a relationship with the above three factors in the following way.

Other things being equal,

(i) The P/E ratio would be higher, when the expected payout ratio is high (D_1/E).

(ii) P/E ratio would be higher when the expected growth rate, g is high

(iii) P/E ratio would be low, when the required rate of return, k is too high

It is necessary for the other things to be equal. If they are not equal then the above mentioned relationships do not exist because P/E ratio would be effected to a large extent with a small change in these relationships.

Q8. Explain the Whitbeck Kisor Model in stock valuation.

Answer : *(Model Paper-I, Q8(b) | May/June-16, Q4(a))*

Whitbeck Kisor Model

The P/E ratio deals with the concerned variables using multiple regression method. Whitbeck and kisor have initiated the model as follows,

P/E = f (Growth rate of earnings g, Dividend payment rate D/E, Risk in the growth rate σ)

Whitbeck and kisor undertook 135 stocks and evaluate the relationship between P/E ratio long with the above variables i.e., P/E = 8.2 + 1.5g + 0.067 D/E 0.2σ

Such equation will show the effect of all the three variables on P/E ratio. Thus $P/E = \dfrac{d/e}{r} \cdot g$

All these three variables in the multiple regression can be related to the above specified equation. The coefficients of the equation will show the weights of the particular variables on the P/E ratio. Whereas, the signs may represent the way of effect of variables on P/E ratio. However, this equation also indicates that one percent increase in standard deviation of growth rate will result in 0.2 unit decrease in P/E ratio. Further, one percent increase in both earnings growth and dividend payout ratio will lead to 1.5 unit increase each in P/E ratio. Hence, the equation shows greater growth, greater dividends and lesser risk would cause great P/E ratio and vice versa.

The analyst may able to calculate the theoretical value of P/E ratio and can compare this value with the actual value only by using whitbeck-kisor model

Incase,

Theoretical P/E is greater than actual P/E → Then sell.

Theoretical P/E is less than actual P/E → Then Buy

Example

Company X's stock growth rate is 12 percent, its dividends payout ratio is 30 percent and its standard deviation in the growth rate is 6 percent. The value of the P/E ratio is 24 percent. On the basis of whitbeck-kisor's model, what is your advice?

Solution :

P/E = 8.2 + 1.5 g + 0.067 d/e   0.2σ

P/E = 8.2 + 1.5 (12) + 0.067 (30)   0.2 (6)

= 8.2 + 18 + 2.01   1.2

= 27.01

Thus, the actual value of P/E ratio is less than the theoretical value and stock is sold.

PROBLEMS ON P/E RATIO

1. **The current dividend on an equity share of Profile Limited is ₹ 4.00. Profile Limited is expected to enjoy an above-normal gorwth rate of 16% for 6 years. Thereafter the growth rate will fall and stabilize at 10%. Equity investors require a return of 16% from Profile's stock. What price you would like to place on the stock of the Profile Limited?**

Solution : *Dec.-14, Q4(b)*

Given that,

g_1 16%

$g_2 = 10\%$

$n = 6$ years

$r = 16\%$

$D_0 = ₹ 4$

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The two-stage growth model is being applied,

$$P_0 = D_1 \left[\frac{1 - \left(\frac{1+g_1}{1+r} \right)^n}{r - g_1} \right] + \left[\frac{D_1(1+g_1)^{n-1}(1+g_2)}{r - g_2} \right] \times \left[\frac{1}{(1+r)^n} \right]$$

$D_1 = D_0(1 + g_1)$

$D_1 = 4(1 + 0.16)$

$\quad\quad 4(1.16)$

$\quad\quad = 4.64$

Substituting the above values in two stage growth model, the intrinsic value is estimated as follows,

$$P_0 \quad 4.64 \left[\frac{1 - \left(\frac{1+0.16}{1+0.16} \right)^n}{0.16 - 0.16} \right] + \left[\frac{4.64(1+0.16)^{n-1}(1+0.10)}{0.16 - 0.10} \right] \times \left[\frac{1}{(1+0.16)^n} \right]$$

$$P_0 = 4.64 \left[\frac{1 - \left(\frac{1.16}{1.16} \right)^n}{0} \right] + \left[\frac{4.64(1.16)^1(1.10)}{0.06} \right] \times \left[\frac{1}{(1.16)^n} \right]$$

$$P_0 = 4.64 \left[\frac{0}{0} \right] + \left[\frac{10.72}{0.06} \right] \times \left[\frac{1}{2.436} \right]$$

$P_0 = 4.64 (0) + (178.669) \times (0.410)$

$P_0 = 0 + 73.254$

$P_0 = ₹ 73.254$

Price of stock of Profile Limited is ₹ 73.254.

2. The Commonwealth Corporation's (CC) earnings and dividends have been growing at the rate of 12 percent per annum. This growth rate is expected to continue for 4 years. After that the growth rate would fall to 8 percent for the next 4 years. Beyond that the growth rate is expected to be 5 percent forever. If the last dividend was Rs. 1.50 and the investor's required rate of return on the stock of CC is 14 percent, how much should be the market value per share of CC's equity stock?

Solution :   *May/June-13, Q4(b)*

Step 1

The series of dividends during the starting 8 years when Common Wealth Corporation enjoys a relatively high growth rates,

$D_1 = 1.50 (1.12) = 1.68$

$D_2 = 1.50 (1.12)^2 = 1.88$

$D_3 = 1.50 (1.12)^3 = 2.107$

$D_4 = 1.50 (1.12)^4 = 2.36$

$D_5 = 1.50 (1.12)^4 (1.08) = 2.55$

$D_6 = 1.50 (1.12)^4 (1.08)^2 = 2.75$

$D_7 = 1.50 (1.12)^4 (1.08)^3 = 2.97$

$D_8 = 1.50 (1.12)^4 (1.08)^4 = 3.21$

Dividend stream's present value

$$= 1.68 \,(\text{PVIF}_{4\%}, 1 \text{ year}) + 1.88\,(\text{PVIF}_{4\%}, 2 \text{ years}) + 2.11\,(\text{PVIF}_{14\%}, 3 \text{ years}) + 2.36\,(\text{PVIF}_{4\%}, 4 \text{ years})$$

$$+ 2.55\,(\text{PVIF}_{4\%}, 5 \text{ years}) + 2.75\,(\text{PVIF}_{14\%}, 6 \text{ years}) + 2.97\,(\text{PVIF}_{14\%}, 7 \text{ years}) + 3.21\,(\text{PVIF}_{14\%}, 8 \text{ years})$$

$$= 1.68(0.877) + 1.88(0.769) + 2.11(0.675) + 2.36(0.592) + 2.55(0.519) + 2.75(0.456) + 2.97\,(0.400)$$
$$+ 3.21\,(0.351)$$

$$= 1.47 + 1.45 + 1.42 + 1.40 + 1.32 + 1.25 + 1.19 + 1.13 = ₹ 10.63$$

Step 2

Compute the price of share at the end of 8 years.

Apply constant growth rate model.

$$P_s = \frac{D_9}{r - g_n} = \frac{D_8(1 + g_n)}{r - g_n}$$

$$= \frac{3.21(1 + 0.05)}{0.14 - 0.05}$$

Where,
$g_n = 5\% \text{ or } 0.05$
$r = 14\% \text{ (or) } 0.14$
$D_8 = 3.21$

$$= \frac{3.3705}{0.09} = ₹ 37.45$$

$$\text{Present price (value)} = \frac{37.45}{(1.14)^8} = \frac{37.45}{2.85} = 13.14$$

Step 3

Total sum of above components,

$$P_o = 10.63 + 13.14 = ₹ 23.77$$

3. The returns of Fashions Ltd. At present is 21%. This assumed to be continued for the next 5 years and after that is assumed to have a growth rate of 10% indefinitely. The dividend paid for the current year is ₹3.2/-. The required rate of return is 20% and the present price is ₹57/-. What is the estimated price according to two stage model. Should you purchase the bond?

Solution :   *(Model Paper-II, Q8(b) | May/June-16, Q4(b))*

According to two-stage model

$$P_o = \left[\sum_{t=1}^{n} \frac{D_0 (1 + g_s)^t}{(1 + k)^t} \right] + \left[\frac{D_{n+1}}{(k - g_n)} \times \frac{1}{(1 + k)^n} \right]$$

Here, $D_0 = ₹ 3.20$,

$g_s = 21\%$

$g_n = 0.10$

$k = 20\%$

$n = 5$ years

By substituting the above values in a given formula, we get,

$$P_o = \left[\frac{3.20(1 + 0.21)}{(1 + 0.20)^1} + \frac{3.20(1 + 0.21)^2}{(1 + 0.20)^2} + \frac{3.20(1 + 0.21)^3}{(1 + 0.20)^3} + \frac{3.20(1 + 0.21)^4}{(1 + 0.20)^4} + \frac{3.20(1 + 0.21)^5}{(1 + 0.20)^5} \right]$$

$$+ \left[\frac{8.30(1 + 0.10)}{(0.20 - 0.10)(1 + 0.20)^5} \right]$$

$$= \frac{3.872}{1.20} + \frac{4.6851}{1.44} + \frac{5.669}{1.728} + \frac{6.8595}{2.0736} + \frac{8.30}{2.4883} + \frac{9.13}{0.24883}$$

$$= 3.2267 + 3.2535 + 3.2807 + 3.3080 + 3.3356 + 36.69$$

$$P_o = ₹ 53.09$$

Since, the estimated price is less than the present market price according to two stage model therefore the bond cannot be bought.

3.4 CAPITAL ASSET PRICING MODEL (CAPM)

Q9. Write briefly about Capital Asset Pricing Model (CAPM). What are the various assumptions of CAPM?

Answer :

Capital Asset Pricing Model (CAPM)

An equilibrium model of asset pricing that states that the expected return on a security is a positive linear function of the security's sensitivity to changes in the market portfolios return. The relevant risk for an individual asset is systematic risk (or market related risk) because non market risk can be eliminated by diversification and systematic risk is measured by beta. In other words, all securities are expected to yield returns commensurate with their riskiness. Therefore, the relationship between an asset's return and its systematic risk can be expressed by the CAPM which is also called the security market line. The equation is as follows,

$$\bar{r}_i = r_f + \beta_i \left[\bar{r}_m - r_f \right] \text{ Where,}$$

$\bar{r}_i$ = The expected return for an asset, r_f is the risk-free rate, $\bar{r}_m$ equals the expected market return (usually assumed to be BSE sensex) and β_i denotes the asset's beta.

The CAPM is an equilibrium model for measuring the risk-return trade-off for all assets including both inefficient and efficient portfolios. A graph of the CAPM is as follows
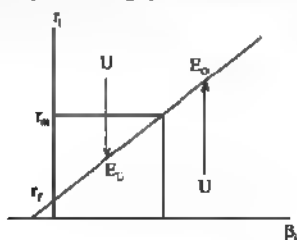

Figure: Capital Asset Pricing Model

The above figure depicts two assets U and O that are not in the equilibrium on the CAPM. Asset U is undervalued and therefore, a very desirable asset to own. U's price will rise in the market as more investors purchase. However, as U's price goes up, it return falls. When U's return falls to the return consistent with its beta on the SML, equilibrium is attained. With O, just the opposite takes place. Investors will attempt to sell O, since it is over valued, and therefore, put downward pressure on O's price. When the return on asset O increases to the rate that is consistent with the beta risk level given by the SML, equilibrium will be achieved and downward price pressure will cease.

Assumptions of CAPM

Some of the assumptions behind the CAPM are as follows,

1. Investors evaluate portfolios by looking at the expected returns and standard deviations of the portfolios over a one-period horizon.

2. Investors are never satiated, so when given a choice between two otherwise identical portfolios, they will choose the one with the higher expected return.

3. Investors are risk-averse, so when given a choice between two otherwise identical portfolios, they will choose the one with the lower standard deviation.

4. Individual assets are infinitely divisible, meaning that an investor can buy a fraction of a share if he or she so desires.

5. There is a risk free rate at which an investor may either lend (that is, invest) money or borrow money.

6. Taxes and transaction costs are irrelevant.

7. All investors have the same one-period horizon.

8. The risk free rate is the same for all investors.

9. Information is freely and instantly available to all investors.

10. Investors have homogeneous expectations, meaning that they have the same perceptions in regard to the expected returns, standard deviations and covariances of securities.

PROBLEMS ON CAPM

1. A stock is currently selling at ₹ 25 and it is expected to received a dividend of ₹ 1 per share at the end of the next year. It is estimated that the stock is available for ₹ 29 at the end of the year,

   (i) If the forecasts about the dividend and price are accurate, is it advisable to buy out the present price? The required rate of return is 20%.

   (ii) If the investor required 15% return where the dividend remains constant. What should be the price at the end of the first year?

Solution : *April/May-14, Q4(b)*

(a) Given that,

$$D_1 = ₹ 1$$
$$P_1 = ₹ 29$$
$$k = 0.20$$
$$P_0 = \frac{D_1 + P_1}{1 + k} = \frac{1 + 29}{1 + 0.20} = \frac{30}{1.20} = ₹ 25$$

Since the estimated price and the actual price are equal, the investor could buy it

(b)   If $k = 0.15$, $P_0 = ₹ 25$

$$P_0 = \frac{D_1 + P_1}{1 + k}$$

$$25 = \frac{1 + P_1}{1 + 0.5}$$

$$1 + P = 25 (1.15)$$

$\therefore$ $P = 28.75 - 1 = ₹ 27.75$

The value of the vigilent at the end of the period should be ₹ 27.75, if its required rate of return is 15%.

2.   Mr. Ashok wants to buy a stock of a company and hold on it for five years. He estimates that ₹ 3.44 dividend would be paid by the company continuously for the next five years. He hopes to sell the shares at ₹ 60/- at the end of the fifth year. His required rate of return is 10%. What is the present price of the stock?

Solution :   *April-15, Q4(b)*

Calculation of Present Value of Company's Stock

Years	Cash Flow (₹)	PVIF @ 10%	PVs
1	3.44	0.909	3.127
2	3.44	0.826	2.841
3	3.44	0.751	2.583
4	3.44	0.683	2.349
5	63.44	0.621	39.396
			50.296

$\therefore$ Price of company's stock would be ₹ 50.296

3.   Pramod Ltd. Operates a large ready made garment system in the textile industry. The current market price of the stock is ₹ 40/- and is expected to be ₹ 55/- after 3 years. The dividend per share would be ₹ 2/- for the next 3 years. Calculate the rate of return of Pramod Ltd's stock.

Solution :   *Dec.-15, Q4(b)*

$$P_o = \frac{D_1}{(1+r)^1} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{P_1}{(1+r)^3}$$

$$40 = \frac{2}{(1+r)^1} + \frac{2}{(1+r)^2} + \frac{2}{(1+r)^3} + \frac{55}{(1+r)^3}$$

This needs trial and error procedure so, first let us try 15 percent return.

$$40 = \frac{2}{(1+0.15)} + \frac{2}{(1+0.15)^2} + \frac{2}{(1+0.15)^3} + \frac{55}{(1+0.15)^3}$$

$$40 = \frac{2}{1.15} + \frac{2}{1.13225} + \frac{2}{1.5209} + \frac{55}{1.5209}$$

$$40 = 1.739 + 1.512 + 1.315 + 36.162$$

$$40 = 40.728$$

The rate of return of pramod Ltd's stock is 15 percent.

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4. Following are the financial forecasts of a company for three years. Compute the value of its share.

Year	2007	2008	2009
Expected dividend	1.80	1.50	2.0
Cost of capital	.06	.063	.059
Growth rate	.111	.2	−0.25

Solution :   *May/June-12, Q4(b)*

Given that,

$D_{2007} = 1.80 \, (D_1)$

$D_{2008} = 1.50 \, (D_2)$

$D_{2009} = 2.0 \, (D_3)$

$K_1 = 0.06$

$K_2 = 0.063$

$K_3 = 0.059$

$g_1 = 0.111$

$g_2 = 0.2$

$g_3 = -0.25$

Value of share, $V = \dfrac{D_1(1+g_1)^1}{(1+K_1)^1} + \dfrac{D_2(1+g_2)^2}{(1+K_2)^2} + \dfrac{D_3(1+g_3)^3}{(1+K_3)^3} + \dfrac{D_n(1+g_3)}{(K_3-g_3)(1+K_3)^n}$

$\therefore \; D_n = D_3(1+g_3)^3$

$2(1-0.25)^3$

$2(0.75)^3$

$= \dfrac{1.80(1+0.111)^1}{(1+0.06)^1} + \dfrac{1.50(1+0.2)^2}{(1+0063)^2} + \dfrac{2.0(1-0.25)^3}{(1+0.059)^3} + \dfrac{2(0.75)^3(0.75)}{(0.059+0.25)\times(1+0.059)^3}$

$= 1.886 + 1.9115 + 0.7104 + 1.7243$

$V = 6.2322.$

5. Tata Chemicals has the following data. Establish the intrinsic value of its share.

Year	March 2006	March 2007	March 2008	March 2009	March 2010
EPS	21.84	13.31	15.32	9.50	5.94
DPS	9.05	5.87	5.87	4.56	4.46
Average share price	271.75	204.77	154.85	154.85	82.20

Solution :   *Jan.-12, Q4(b)*

Intrinsic value = Average P/E × Average EPS.

$P/E = \dfrac{\text{Avg share price}}{\text{EPS}}$

$\therefore \quad P/E_{06} = \dfrac{271.75}{21.84} = 12.44$

$P/E_{07} = \dfrac{204.77}{13.31} = 15.38$

$$P/E_{08} = \frac{154.85}{15.32} = 10.11$$

$$P/E_{09} = \frac{154.85}{9.50} = 16.30$$

$$P/E_{10} = \frac{62.20}{5.94} = 10.47$$

$$\text{Average } P/E = \frac{12.44 + 15.38 + 10.11 + 16.30 + 10.47}{5}$$

$$= \frac{64.7}{5}$$

$$= 12.940.$$

$$\text{Average } EPs = \frac{12.44 + 15.38 + 10.11 + 16.30 + 10.47}{5}$$

$$= \frac{64.7}{5}$$

$$= 13.182$$

Therefore, intrinsic value of the share,

$$= \text{Average P/E} \times \text{Average EPS}$$
$$= 12.940 \times 13.182$$
$$= ₹ 170.58$$

3.5 FREE CASH FLOW MODEL

Q10. What is free cash flow model? Discuss the procedure involved in it.

Answer :

Free Cash Flow Model

Free cash flow model deals with the evaluation of firms value i.e., value of equity with the help of the discounting factor. The free cash flow to investors must be multiplied with the discounting factor and the obtained value is deducted from the value of preference and debt.

Procedure of Free Cash Flow Model

Free cash flow model entails the following procedure as follows.

Step 1: Divide the Future into Two Periods, the Explicit Forecast Period and the Balance Period

Duration of explicit forecast period ranges from 5 to 15 years which represents the period within which the firms is expected to evolved and grown. So as to reach at the stable level. The stability of the firm is characterised by stable return on invested capital [or return on capital employed], growth rate and the cost of capital.

Step 2: Forecast the Free Cash Flow, Year by Year During the Explicit Forecast Period

The Free Cash Flow (FCF) refers to the net cash flows available with the firm after distributing them to the capital providers (shareholder and debt holders) and after making investments in fixed assets and net working capital. The amount of free cash flows plays a vital role in the growth and development of the firm.

The FCF is calculated as,

$$\boxed{\text{NOPAT - Net investment}}$$

Where, (NOPAT) refers to Net Operating profit adjusted for Taxes.

NOPAT = Profits/Earnings before interest and tax [1 − tax rate]

Whereas, the net investment is equal to,

$$\boxed{\text{Change in net fixed assets + change in net working capital}}$$

Step 3: Computation of the Weighted Average Cost of Capital [WACC]

The weighted average cost of capital is an aggregation of multiple costs overheads utilised by the company. Most commonly used costs include the post-tax cost of equity, preference and debt.

$$\boxed{\text{WACC} \quad w_q r_q + w_f r_f + w_c r_c (1 - t)}$$

Where,

w_q, w_f, w_c, are the weights related with equity, preference and debt.

r_q, r_f, r_c, are the costs related with equity, preference and debt.

Note :

Cost of debt 'r_c' is obtained after tax as interest on debt is a tax-deductable payment.

Step 4: Establish the Horizon Value of the Firm

The value set on the firm's asset at the end of the explicit forecast period (N years) is usually termed as the "horizon value" [v_N] where, FCF grows at a constant rate of 'g' beyond N then the horizon value is found to be,

$$\boxed{v_N = \frac{FCF_{N+1}}{WACC - g}}$$

Step 5: Evaluate the Enterprise Value

Enterprise value is also called as the firm value which is the combination of the present value of FCF during the explicit forecast period and the present value of the horizon value. Enterprise value will be,

$$EV = \frac{FCF_1}{(1+WACC)} + \frac{FCF_2}{(1+WACC)^2} + \cdots + \frac{FCF_N}{(1+WACC)^N} + \frac{v_N}{(1+WACC)^N}$$

Present value of the FCF during explicit forecast period

Where,

$\dfrac{v_N}{(1+WACC)^N}$ is the present value of the horizon value.

Step 6 : Derive the Equity Value

Equity value is equal to,

Enterprise value – Preference value – Debt value

Step 7: Determination of the Value Per Share

Value per share is determined as,

$$\frac{\text{Equity value}}{\text{Number of Outstanding Equity shares}}$$

PROBLEM ON FREE CASH FLOW MODEL

1. XYZ's balance sheet at the end of year 0 is given below,

Liabilities		Assets	
Shareholders funds	300	Net fixed asset	450
Equity capital	150		
[15 crore of ₹ 10 each]		Net working capital	150
Reserves and surplus	150		
Loan funds rate 10 percent	300		
	600		600

XYZ Ltd ROIC also referred as NOPAT/invested capital is expected upto 10 percent. Growth rate in assets, revenues and NOPAT is estimated at 15 percent for the first two years, 10 percent for the next two years and 8 percent thereafter.

The effective tax rate of the company is 30 percent and the pre tax cost of debt is 10 percent where the debt equity ratio of the company will be maintained at 1:1.

From the above information compute the intrinsic value of the equity shares.

Solution :

Step 1 Explicit forecast period is 5 years as the company reaches at stable level after 5 years.

Step 2 Free cash flow forecast for the explicit forecast period can be estimated as follows.

Year	I Year	II Year	III Year	IV Year	V Year
(a) Asset value	600.0	690.0	793.5	872.9	960.2
(b) NOPAT	60.0	69.0	79.4	87.3	96.0
(c) Net investment	90.0	103.5	79.4	87.3	76.8
[Asset value of succeeding year, (asset value of preceding year)] FCF (b - c)	(30.0)	(34.5)			19.2
Growth rate (%)	15	15	10	10	8

Step 3 Computation of weighted average cost of capital [WACC]

$$WACC = W_q r_q + W_e r_e (1-t)$$

$$0.5 \times 10 + 0.5 \times 10 (1-0.3)$$

$\Rightarrow$ 8.50 percent.

Step 4 The horizon value of the company is,

$$H_V = \frac{FCF_{N+}}{WACC - g}$$

$$\rightarrow \frac{FCF_N(1+g)}{r-g} \rightarrow \frac{19.2(1.08)}{0.085-0.08} \rightarrow \frac{20.736}{0.005}$$

$\Rightarrow$ ₹ 4,147.2 crores

Step 5 Enterprise value of XYZ is,

$$EV = \frac{-30.00}{(1.085)} - \frac{34.50}{(1.085)^2} + \frac{0}{(1.085)^3} + \frac{0}{(1.085)^4} + \frac{19.2}{(1.085)^5} + \frac{4,147.2}{(1.085)^2}$$

$$= 27.65 - 29.310 + 0 + 0 + 12.77 + 2758.08$$

$$= ₹ 2713.89 \text{ crores}$$

Step 6 Calculation of equity value of XYZ Ltd.,

Enterprisevalue = Debt value

$\rightarrow$ 2713.89 – 300 $\qquad$ $EV = ₹ 2713.89$ crores

$\Rightarrow$ ₹ 2,413.89 corres $\qquad$ $DV = ₹ 300$ crores (Given)

Step 7 Calculation of value per share of XYZ Ltd.,

$$= \frac{\text{Equity value}}{\text{Number of outstanding equity shares}}$$

$$= \frac{₹ 2,413.89 \text{ crores}}{15 \text{ crores}}$$

$$= ₹ 160.926 \text{ crores}$$

3.6 RELATIVE VALUATION USING COMPARABLES P/E, P/BV, P/S

Q11. What are the various measures of relative value? Explain.

Answer : *Model Paper-III, Q8(a)*

Equity analysts mostly use a few other comparative valuation ratios or calculate additional measures of relative value such as,

1. Price earnings ratio

2. Price/book value ratio

3. Price/sales ratio.

1. Price Earnings Ratio

Price-earnings ratios are used to estimate the value of the stocks by the investors rather than adopting the discounting models. Every financial magazine and the newspaper at regular interval publish price earnings per share. The P/E ratio models have three distinct advantages over the discounting models,

(a) P/E ratios indicates price per rupee of share earnings. This would help to compare the prices of stocks, which have different earnings per share.

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(b)   P/E ratios are helpful in analysing the stocks of the companies that do not pay dividend but have earnings. It should be noted that when there is a loss, the P/E ratio analysis is difficult to use.

(c)   The variables used in P/E ratio models are easier to estimate than the variables used in the discounting model

We know that, by definition $D = E (1 - b)$, where D is dividend per share, E is earning per share and b is the earnings retention rate [$(1 - b)$ is the dividend payout ratio]. Therefore, an equivalent earnings based valuation model is,

$$P_0 = \frac{E_1(1-b)}{k-g}$$

Where,

   P_0 = Stocks present value

   E_1 = Expected earnings at the end of year 1

   b = Retention rate

   g = Expected growth rate and

   k = Required rate of return.

It is also true that $E_1 = E_0 (1 + g)$, where E_0 is current earnings per share. The above equation can be stated in terms of P/E ratio as follows,

$$\frac{P_0}{E_0} = \frac{(1+g)\left(\dfrac{D_0}{E_0}\right)}{k-g}$$

Determinants of P/E Ratio

Initially, estimated value of a stock need to be considered which is denoted as P and in terms of a constant growth of dividends discount model

$$P_0 = \frac{D_1}{k-g} \qquad ...(1)$$

Divide both sides of equation (1) with E_1, which is expected earnings of year 1

$$\frac{P_0}{E_1} = \frac{D_1/E_1}{k-g} \qquad ...(2)$$

P/E ratio depends on the factors present in equation (2).

Where,

   D_1/E_1 = Expected dividend payout ratio

   g = Expected growth rate of dividends

   k = Required rate of return.

P/E ratio exists in a relationship with the above three factors in the following way, other things being equal,

i)   The P/E ratio would be higher, when the expected payout ratio is high (D_1/E_1).

ii) P/E ratio would be higher, when the expected growth rate, g is high.

(iii) P/E ratio would be low, when the required rate of return, k is too high.

It is necessary for the other things to be equal. If they are not equal then the above mentioned relationships do not exist because P/E ratio would be effected to a large extent with a small change in these relationships.

2.   Price/Book Value Ratio

For answer refer Unit-III, Page No. 3.18, Q.No. 12.

3.   Price/Sales Ratio

For answer refer Unit-III, Page No. 3.19, Q.No. 13

Q12. Define P/BV or price to Book Value Ratio. What are the determinants of P/BV ratio?

Answer :

Price to Book Value Ratio or P/BV

The book value of each share is the net value of the company (i.e., Assets - Liabilities) which are divided by the number of issued equity shares. Accounting conventions and economic events are being used for ascertaining the book value. While the market price of the share is ascertained by the manner in which the market evaluates its earning power.

Market price to book value ratio is calculated as follows,

PBV ratio = Price ÷ book value ratio =	$\dfrac{\text{Market price per share at time } t}{\text{Book value per share at time } t}$

Investors gets highly attracted by PBV ratio. In 1990's, Eugene Fama and others have stated that PBV ratio contributors greatly in the returns from stocks.

Determinants of the PBV ratio

The determinants of the PBV ratio can be clearly understood with the help of the constant growth dividend discount model,

$$P_0 = \frac{d_1}{R-G}$$

Where,

   d_1 = Dividend for next period

   G = Growth rate

   R = Rate of return

   e_0 = Earnings per share

   $(1 - a)$ = Dividend payout ratio

   $d_1 = e_1(1-a)$

   $= e_0(1+G)(1-a)$

Substituting the value of d_1 in constant growth dividend discount model.

$$P_0 = \frac{e_0(1+G)(1-a)}{R-G}$$

As e_0 is the outcome of book value per share (bv_0) and return on equity (ROE), the above equation can be written as,

$$P_0 = \frac{bv_0(ROE)(1+G)(1-a)}{R-G}$$

Divxling both the sides of above equation by book value per share. It results in,

$$PBV \text{ ratio} = \frac{P_0}{bv_0} = \frac{(ROE)(1+G)(1-a)}{R-G}$$

In the above equation, numerator indicates that if other things being equal a higher ROE leads to increase in PBV ratio. While the denominator indicates that higher ROE results in increase of PBV ratio indirectly as G = (Retention Ratio)(ROE) = (a) (ROE).

Q13. Explain how price to sales ratio (PS ratio) is calculated. What are the determinants of PS ratio?

Answer :

In the last few years, the price / sales ratio (PS ratio) has gained much importance as a valuation technique. The PS ratio is computed by dividing the company's current stock price by its revenue per share for the last twelve months. On the other hand, it can also be computed by dividing the present market value of equity capital by the yearly sales value of the firm. Basically, the PS ratio explains and indicates the market's willingness as to pay in exchange of one rupee of sales.

The following are some of the problems which the investors may face while using the PE ratio,

1 Highly inconsistent earnings.

2 Negative earnings

3 Earnings may be explained in various ways

4. Possibility of Managed earnings.

In order to remove or reduce such type of problems, PS ratio must be used continuously. James O'shaugnessy after evaluating various tools and techniques of investment like book value, return on equity, PE ratio, yield, PS ratio etc, have suggested and recommended that out of all the investment tools PS ratio has been considered as the most useful tool. This is because the portfolios of low PS ratio stocks are more effective than the portfolios of high PS ratio stocks.

According to a famous thumb rule a standard PS ratio of 1.0 can be used by all companies. The stocks which are traded at PS ratio and which are less than 1.0 Example 0.5 are considered as 'bargains'. PS ratio is not same for all industries. It basically differs from one industry to another industries firms because the factors like net profit margin, growth rate, asset turnover, etc are not same for all, they vary from one firms to another firm.

The PS ratio is a technique of relative valuation and is being interpreted in terms of drivers. One of the key drivers of PS ratio is the net profit margin which implies that PS ratio is considered as PS ratio/Net profit margin. PS ratio being one of the technique of relative valuation must be compared with the industry average and its own history.

Determinants of the PS Ratio

The determinants of the PS ratio can be understood clearly with the help of the following equation,

$$P_0 = \frac{e_0(1+G)(1-a)}{R-G}$$

Since, the earnings per share (e_0) is equal to sales per share (s_0) times net profit margin (NPM). Then it can written as,

$$P_0 = \frac{s_0(NPM)(1+G)(1-a)}{R-G}$$

Both the sides of equation are divided by further resulting into,

$$PS \text{ ratio} = \frac{P_0}{s_0} = \frac{(NPM)(1+G)(1-a)}{R-G}$$

Where,

G = Growth rate

R = Rate of return

$(1-a)$ = Dividend payout ratio

NPM = Net profit margin

s_k = Sales per share.

3.7 SECURITY MARKET - MEANING AND CLASSIFICATION

Q14. What do you mean by security market, classify security markets in detail?

Answer :

Security Market

The securities market refers to the market for equity debt and derivatives. The debt market is further classified into three types i.e., the government securities market, the corporate debt market and the money market. The derivatives markets are also further classified into two types namely the options market and the futures market.

Securities market is the market which influences the modern life greatly. The terms "Dalal Street", "the gilt edged market" and "the Nifty", are indefinite on unclear to understand but still they are being used by the people to refer the sensex or the securities market

Examples of securities market at work are i.e., the activities which takes place under securities market are as follows,

"Sensex falls by 400 points with in a day after a turbulent day's trading. The Reserve Bank of India has decreased the repo rate by 30 basics points". "The Government of India increases 2500 crore rupees by issuing bonds with a maturity period of 15 years".

Classification of Securities Market

Securities markets are broadly classified into types as follows,

1. Primary markets and
2. Secondary markets.

1. Primary Markets

The market where in new securities are being issued in lieu of each from an investor is called as primary market. Investment bankers are mostly being used as the instrument of activities. New issue of securities which takes place in the primary market are the new sales of treasury mills or IBM stock, or North carolina bonds. The issuers of these securities are basically the U.S. government, IBM and the state of North Corolna. Common stock sales of a publicly traded company are called as "seasoned new issues".

When the issuer issues sell the securities for the first time in the market then they are call as Initial Public Offerings [IPO's] As soon as the original purchaser sells, the securities in the primary market then, they are traded in the secondary markets. New securities are basically traded continuously in the secondary market where in the original purchasers does not get effected as they well not receive any additional cash from these transactions.

In India Equity market is also called as primary market which functions as per the guidelines of SEBI (Securities Exchange Board of India). There are three different ways by which a company can raise its equity capital in the primary market as follow,

(i) Public issue
(ii) Rights issue
(iii) Preferential allotment
(iv) Global investment banking private placement.

(i) Public Issue

Public issue is the sale of securities to the public at large and is governed and controlled by the provisions of the companies Act, 1956, SEBI guidelines about Investor Protection and the listing agreement between the issuing company and the stock exchanges.

In the U.S public issues of stocks as well as bonds are managed by Investment bankers who acts as the underwriters. Firms with greater experience in the sale of new securities the public usually carriers out such activities by underwriting the issue. Their investment bankers acts as intermediaries

between issuers and investors. For instance the issuer sell the securities to the investment bankers who further resells the securities to the investors. Thus, the investment bankers underwriters the new issues by purchasing the securities from the issuer and assuming the risk of reselling the securities to the investors.

(ii) Rights Issue

Rights issue is an official invitation given by the company to its shareholders regarding the subscription for the purchase of further shares issued by a company. A 'right' represents an option or a choice that has to be made by a shareholder for the purchase of securities at a predetermined price. A limited company after obtaining the approval from its articles of association can issue new shares (either equity or preference) such terms ensure the equitable distribution of shares without altering the existing shareholdings in the company. Section 81 of the Companies Act, 1956 has laid down a procedure for a public limited company who want to increase their share allotments, after the expiry of two years from the incorporation and the formation of the company. It includes the following steps,

(a) Issue of shares in proportion of their contributions made for the paid-up capital
(b) Issue of notice as an offer specifying the number of offered shares.
(c) Accepting the offer for the purchase of allotted offered number of shares within the stipulated time period, which should not exceed beyond 15 days of the issue of notice
(d) Shareholders can use their rights for renouncing the offered shares to their nominees. The further subscription of shares offered to the existing shareholders are called "right shares" However, such shares become privileged subscription or right issue if they are offered to the equity shareholders.

(iii) Preferential Allotment

Preferential Allotment means an issue of an equity by a listed company to the selected investors at a price which may or may not be in accordance with the prevailing market price especially in the Indian Capital Market.

(iv) Global Investment Banking

Initially selling of new securities was restricted only in the domestic markets but, presently the scenario has been changed due to globalization. The globalization enables and helps the companies to raise new capital from different countries across the globe. A new concept has been introduced as "global equity offering" in the investment banking. This investment banking emphasizes mainly upon global offering of securities and the lead investment banker acts as "global coordinator" who connects different underwriting syndicates throughout the globe for the purpose of equity shares issues.

U.S firms presently sells bonds in the new euro market.

(v) Private Placements

Recently, many corporations have started introducing the "private placement" where in the new securities issues such as debt securities are being directly sold to the financial institution like Life Insurance Companies and pension by passing the open market. As the registration is necessary for these private placements this results in time and money saving as well as saving fee for the investment bankers due to absence of investment bankers.

2. Secondary Markets

A secondary market is the market in which the remaining or the existing securities are traded between the investors. These markets helps the investors by providing them a mechanism for trading the existing securities. In this market, securities are resold when investors considers these securities as attractive opportunities. Secondary market is the place where common and preferred stock, warranty, bonds and puts and calls are traded among the investors.

In U.S the Equities are traded in three major markets which are as follows,

(i)   The New York Stock Exchange (NYSE)

(ii)   The American Stock Exchange (AMEX)

(iii) The NASDAQ Stock Exchange (NASDAQ)

(iv)   Over-the-counter stocks

(v)   Electronic Communication Networks (ECN's).

All these markets deals with trading of listed securities. Among these three major markets of U.S. securities, the NYSE and AMEX are the auction markets which are located in New York and the other stock market i.e., Nasdaq stock is an electronic market dealers of who creates a market is Nasdaq stocks. The investors are indicated by 'brokers' who act as an intermediary between the buyers and sellers in securities transaction and receives commission for carrying out their transactions.

(i) New York Stock Exchange (NYSE)

It is one of the oldest and most famous secondary market in the United States. It is considered as one of the most effectively controlled stock exchange in the world which also has the ability to function during crisis.

The NYSE is a not-for-profit organisation which has member firms who own seats and only these member firms can buy and sell securities on the trading floor.

NYSE outlines certain lending requirements which the firms must fulfill for listing their securities at the NYSE.

(ii) American Stock Exchange (AMEX)

The Amex is the second national organised exchange whose procedures are similar to the procedures of NYSE. However, when compared NYSE, AMEX is smaller whose membership is limited only upto 807 regular members the listing requirements of AMEX are less complicated or strict when compared to the NYSE. At presently, AMEX trades nearly 135 NASDAQ-listed stocks.

(iii) The NASDAQ Stock Market

The Nasdaq stock market is a competitive dealer market which consists of network of dealers or market makers who creates market and are ready to buy and sell securities at specified prices.

In this market, the dealers are involved in the transaction and acts as an intermediary and the securities are purchased from the and sold to them. They will earn profits by the spread on difference between the two prices.

The actively traded stocks which are not traded at the NYSE or Amex are a part of NASDAQ stock market (NASDAQ). Nasdaq was initially introduced by the NASD (The National Association of Security Dealers) which is a self-governing body of brokers and dealers. Presently, NASDAQ is a privately owned corporation by its shareholders.

(iv) Over-the-Counter Stocks

Over-the-counter securities means the securities which are not listed and traded at an organised exchange on market. They are unusually traded at the over counter markets. It is an over-the-counter market. It does not denote a particular place or floor where dealers assemble and transact foreign currencies. Rather, it is a network of banks, brokers and dealers spread across the various financial centres of the world. The market relies more on communication network and that is why transactions are based normally on spoken and followed by written communication.

(v) Electronic Communications Networks (ECN's)

Conventional form of Trading equity securities through agency auction markets have been replaced by fully computerized NASDAQ market. Because of the modern changes of Electronic Communication Networks [ECN's] have a clear impact on the functioning of the conventional markets like NASDAQ and the NYSE.

An ECN is a computerized trading network for institutions and large traders. Electronic Communication network matches the buying and selling orders obtained from the subscribers and customers. After matching these orders, they can be transferred to brokerage firms for the trading of securities.

(vi) National Stock Exchange (NSE)

The National Stock Exchange was started in November 1992. Its initial capital outlay was ₹ 25 crores which was subscribed by the Industrial Development Bank of India (IDBI) and co-subscribed by other lending institutions such as GIC, LIC, other insurance companies,

banks, financial institutions including the SBI capital market Ltd, Stock Holding Corporations Ltd, Infrastructure Leasing and Financial Services Ltd and International Securities Consultancy of Hongkong. NSE has an automated, electronic and screen based system of trading.

Objectives

Following are the objectives of NSE,

(a) To facilitate the book-entry settlement systems and shorter settlement cycles.

(b) To offer access to the investors across the country with the help of a suitable communication network.

(c) To provide an effective and fair trading facility for debt instruments, hybrids and equities all over the country

(d) To encourage the secondary market in debt instruments like government and corporate bonds

(e) To develop the Indian stock market in accordance with the International markets.

(vii) Bombay Stock Exchange (BSE)

Bombay Stock Exchange is an ancient stock exchange in India. In is regarded as the most important part of the economy which reveals the economic conditions. Basically BSE was operating in Mumbai alone but with the help of Bombay Online Trading System (BOLT), its operations spread over to 275 cities by March 2000. The number of trade workstation was also increased to 3803. There was an increase in its daily turnover from ₹ 11 crores during 1979-1980 to ₹ 4587 crores in the year 2000-2001

Initially, the membership fee in BSE was just ₹ 1 in 1857, which further increased to ₹ 5 in 1877, ₹ 1000 in 1896, ₹ 2500 is 1916, ₹ 6600 in 1929, ₹ 62000 at the time post World War II period and finally reached to ₹ 2.80 crore during the year 2000

The Bombay On Line Trading system (BOLT) was established by BSF in 1995 for providing the automated trading facility which further initiated the debt trading.

3.7.1 Security Market Indexes and Their Uses

Q15. Explain in detail about security market indexes. Also highlight the user of security market indexes.

OR

"Stock market indices are the barometers of the stock market". Discuss.

(Refer Only Topics. Security Market Indexes, Uses of Security Market Indexes)

Answer :   *Dec.-15, Q4(a)*

Security Market Indexes

A securities market index represents the performance of the market and ascertains the mean (average) value of a several securities which are selected as a sample which represents the behaviour of general market. Indexes are mainly developed to provide the in-depth, independent and impartial and constant barometers of a board market

In order to ascertain various trends the investors mostly make use of indexes which helps them in making correct decisions. Some of the popular indexes are as follows,

1. Dow Jones Industrial Average (DJIA)

The Dow Jones Industrial Average (DJIA) is one of the widely used indexes. It involves only the prices of 30 actively traded blue-chip stocks which includes the reputed companies like American express, AT&T, Caterpillar, Citigroups, Coca-Cola, Wal Mart and Walt Disney. The average is computed by summing up the closing prices of the 30 stocks and dividing it by a number used for adjusting splits, spin offs and dividends

2. Standard and Poor's 500 Index

The famous standard and Poor's (S&P) 500 Index highlights the fluctuation of prices of 500 stocks of well established, large organisations. It comprises the stocks of 400 industrial firms, 40 financial institutions, 40 public utilities and 20 transportation companies. The index is greatly influenced by the companies who hold the highest market value

3. NASDAQ Composite Index

The NASDAQ composite index takes into consideration nearly all the U.S stocks that were traded in the Over-The-Counter (OTC) market in the automated quotations system which are taken care by the national association of securities dealers.

4. Russell 3000 Index

On the basis of the total market capitalization, the Russell 3000 Index evaluates the performance of 3000 largest U.S companies.

5. Wilshire 5000 Index

The Wilshire 5000 Index reflects the aggregate market value of nearly 6000 plus U.S headquartered stocks which are traded on major exchanges.

6. Foreign Stock Exchanges

The stock exchanges which are situated big cities of the world like London, Sydney, Tokyo, Toronto and Kuala Lampur are called as foreign stock exchange. The investors in U.S usually examines the stock exchanges the whole night in order to get a clue of what will happen during the day time in U S stock market.

Uses of Security Market Indexes

Security Market Indexes are useful in serving various specific purposes. The major use of index values is to calculate the aggregate returns for the total market or few part of market during a particular period of time. The rates of return that are being calculated are used as benchmark to analyzing the individual s portfolio performance.

While assessing the portfolio's performance the investors must be capable of experiencing a selecting i.e., comparable to market return by rand only choosing the large number of stocks or bonds from the total market. Hence, in order to analyze the performance of professional money managers an aggregate stock or bond market index is being used as a benchmark.

The indicator series are also useful in developing an index portfolio. It is not possible for many money managers to effectively out perform particular or certain market indexes on a risk-adjusted basis over time. This result in the formation of index funds which basically aims at monitoring the performance of the particular market series which derives the similar rate of return.

Security market indexes are used by securities analysts, portfolio managers and others for determining the factors which affects aggregate security price changes. It is also useful in analyzing the relationship among stock and bond returns of various countries.

Technicians is the another group who are also interested in aggregate market series and who holds an assumption that the previous price changes can be used for forecasting the future price changes. Systematic risk is a relationship that exists among the rates of return for a risky asset and rate of return for a market portfolio of risky assets. Hence, while calculating the systematic risk, it is essential to know individual risky asset so that its returns are related to the returns for an aggregate market index which are used as a proxy of the market portfolio of risky assets.

In short the, security market indexes are used,

1. Security market indexes are used as benchmarks for analyzing the performance of professional money managers.

2. It is useful in developing and examining an index fund.

3. It is useful in assessing the market rates of return in economic studies.

4. It is used by technicians for forecasting the future market fluctuations.

5. It can be also used as a proxy for market portfolio of risky assets while computing the systematic risk of an asset.

Q16. Explain the significance and problems in constructing security market indexes.

Answer :   *Dec.-12/Jan.-13, Q4(a)*

Significance in Constructing Security Market Indexes

For answer refer Unit-III, Page No. 3.22, Q.No. 15, Topic: Uses of Security Market Indexes.

Problems in Constructing Security Market Indexes

Problems/Challenges/Issues in constructing security market indexes are as follows,

1.   Reliability of Indices

Indices are based on samples. These indices are highly reliable in nature. Index with a small sample of large companies is usually preferable, in case when the objective is to determine the fluctuations that takes place in the stock value. This is because in a small sample, only few large companies hold maximum number of stocks.

2.   Diversification

Diversification of index is found to be helpful in reducing the risk in stock at a diminishing rate. That is, by increasing the number of stocks in index, it would result in decreasing risk rate of the index. But in case of increasing the number of stocks, it is also possible that the illiquid stocks may enter into the market. These illiquid stocks greatly affects the quality as well as the value of index. Therefore, while diversifying stock indices, liquidity aspect needs to be taken into consideration.

3.   Objective or Goal of Index

Setting up objective/goal/motto is also a bigger challenge while constructing stock market index. Major indices of the world basically aims at the following two objectives i.e., firstly, representing fluctuations in the aggregate value of all stocks or, secondly, representing fluctuations in the price of typical or aggregate stock.

When an index aims at representing fluctuations in aggregate value of all stocks, then it is also called as a "value-weighted index".

Example: The standard and poor's composite 500 index.

♦   FTSE (London)

In case of value-weighted index, researchers states that it would be profitable to have free-float cap weighted index instead of the market cap weighted index.

When an index aims at representing fluctuations in price of typical or aggregate stock, then it is also called as an "Equal-weighted index".

Example: "The Dow Jones Industrial Average (DJIA).

♦   "Nikkei 225".

Q17. Explain types of brokers and brokers account involved in trading of securities.

Answer :

The broker selection by the customers depends on the services offered and fees charged. The following are the types of brokers. They are,

Types of Brokers

| 1. Full-service Brokers | 2. Discount Brokers | 3. On-line Discount Brokers |
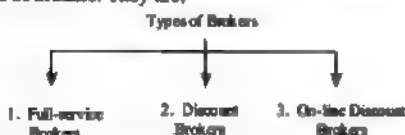
1.   Full-Service Brokers

Brokerage firms provides huge services to investors in terms of information and advice. Full-service brokers information regarding existing economy, individual companies, bond market etc. Some of the brokers information which the investors get consist of prudential, Paine Webber, Merrill lynch, Morgan Stanley Dean writer etc. These brokers provide necessary advice to customers regarding trading of securities, execute customer's orders, send publications related to individual stocks, industries bonds etc. Full-service stock brokers are otherwise called financial consultants or investment executives because they get their less than 50% income from the services provided to the investors.

2.   Discount Brokers

Investors can also avail discount brokers services. The difference between, full-service brokers and discount brokers is that, full-service brokers provides all services by charging fees whereas discount broker provide services at low cost and offer no advice or publications. Some of the popular discount brokers include Charles Schwab, Quick and Reilly, Fidelity investments etc.

According to the survey journal American Association of Individual Investors, the discount brokers have the following,

(i)   The commissions they offer differs and the nature of providing their services toward securities trading for investors. The brokers who were earlier on-line brokers charge flat-rate for the services offered.

(ii)   Few discount brokers provide information regarding research and investment

(iii)   62% of discount brokerage firms provide on-line trading by internet.

(iv)   Most of the discount brokerage firms facilitates touch-tone phone system to receive information and to place stock orders.

3.   On-line Discount Brokers

As the name implies, the on-line discount brokers provide trading of securities and information to investors through on-line trading/internet.

Types of Brokerage Accounts

The following are the types of brokerage accounts,

(i)   Cash Account

It is one of the type of brokerage account in which the investors pays the whole price for the purchase of securities to the brokerage house. Customers open margin account because it facilitates investors the facility of borrowing from brokerage firm in order to purchase a security the minimum amount necessary to open, this type of account for NYSE is $ 2000.

(ii)   Asset Management Account

This account can be open by having a minimum balance from $ 1000 to $ 25,000 and the payment of an annual fee (in the following cases).

(a)   From zero for discount brokerage like Schwab,

(b)   To $100 or more than that for full-service brokerage firms.

This account offers automatic reinvestment associated with account holder's free credit balances in shares for both money market and government fund. Account holders of this type are issued bank checks and a bank card.

(iii)   Wrap Accounts

It is the new type of brokerage account. All costs such as cost related to broker consultant and money manager, transactions, costs, custody fees, cost of detailed performance reports are wrapped in one fee. Brokers in this type of account can be either middlemen or matching clients with independent money managers.

One of the well-known brokerage house offering this account is Merrill Lynch with five different types of wrap programs to investors and the investors can take decisions related to buy and sell of securities. Other financial companies like bank trusts also provide this type of account. A new type of wrap account is the 'mutual fund wrap account'

Q18.   Explain briefly commission, investing without broker, orders in the NASDAQ stock market, actual order trading and types of orders involved in security trading.

Answer :

Commissions

The NYSE charges fixed commissions to its members. Brokerage cost for individual investors are more because of heavy competitions and influence of internet. Full-service brokers charges high commissions and discount brokers charges commissions ranging from $10 to $30 or depending upon the type of trade they undertake for the investors.

Investing without a Broker

Companies are offering Dividend Reinvestment Plans (DRIPS). The company make use of dividend paid by investors on shares in order to purchase extra shares, or full, or fractional. For this, there is no brokerage or administrative fees to be a part of company's DRIP, investors purchase stock by using the services of their or brokers and in some companies the shares are sold directly to investors. Once the investors become the member of company's DRIP, the investors can invest additional cash at specified intervals and

they also have the facility of redeeming the shares on phone. The major benefits of this plan includes dollar-cost averaging which facilitates purchase of shares at the time of low price in the stock market. Companies are now progressing and issuing Direct Stock purchase plans (DSPPS) to initial investors.

Orders in the NASDAQ Stock Market

Orders in the NASDAQ stock market depends on the forces of supply and demand. The dealers considers and the match the forces of supply and demand for fixing the price of securities. Market makers quote bid and asked prices to all the securities traded in the stock market.

Actual Order Trading

Generally, the securities are traded safely in the stock market. A Securities and Exchange Commission (SEC) rule is that NASDAQ brokers need to post limit orders within 30 seconds in order to facilitate spreads.

Types of Orders

There are three types of orders which the investors use. They are,

(i)   Market Orders

It is the most common type of order this orders gives instruction to brokers to buy or sell the securities at the earliest at the best price available.

(ii) Limit Order

It instructs a particular price to be met or bettered. Investors have the option of using limit orders as day order for 1 day only, and for open orders which have its effect for 6 months till the orders are cancelled or renewed. Limit orders concerning more than one share are to be filled in whole or in part till completed, unless the order is specified as all or none or immediate or cancel or fire or kill

(iii) Stop Order

Stop orders are exercised when the price level reaches to a certain extent for buying and selling of securities. A buy stop order is always above the current market price and the sell stop order is considered below the current market price. If the stop limit price is met then the stop limit order itself becomes the limit order

Clearing Procedures

The settlement date is three business days after the completion of trade date. The customer / investor becomes the sale owner of the securities held by then on the settlement date. Most of the customers prefer to keep their securities in a street name or brokerage firms. The customers receives monthly statements of their securities held and the information regarding funds borrowed from broker on lend etc. The Depository Trust Company (DTC) carry out the transactions of securities by the help of computers. Dealers and brokers processing stock certificate deposit them in an account and these securities are traded to another dealer by following the system if both-keeping.

Q19. How investor is protected in securities market?

Answer :

Investors are held with the responsibility to manage securities markets for their protection. The financial system is based on the trust and confidence. During nineteenth and twentieth centuries, several malpractices were observed due to the lack of information disclosure and even the trading procedures. Were not financially sound. The market crash which was observed in 1929 and the great depression served as the catalysts for the reforms that were started in the 1930s.

Investor protection is classified into government regulation, self-regulation by industry and by the primary federal.

Government Regulation, Federal Legislation

Many legislations have been opened and passed during the great depression in order to control the functioning of the securities, markets and industry. In 1920s due to the occurrence of many unlawful and undesirable trading practices, markets were completely shattered in the crash of 1929. Thereafter, congress shattered in the crash of 1929 Thereafter, congress tried a lot for improving the stability and viability of the securities markets, which acts as a basis for the introduction of securities regulation act in the year, 1930. Over the last 50 years, many additional acts were passed. The Justice department is responsible for examining and taking actions towards the illegal abusive practices, that are commonly seen in the financial markets.

The Securities and Exchange Commission

The Securities and exchange commission (SEC) was formed by the US government in 1934 as an independent, quasi-judicial agency. The main objective of this commission was to manage laws dealing with the securities and to implement protection the investors measures for protecting investors and public during securities transactions. The President appoints five members for a period of years lawyers, accountants security analysts and others, the staff of the commission were divided into divisions and offices. The SEC has 200 examiners approximately. Under the securities Act of 1933, the SEC has ensured that the new securities need to be registered with the commission before offering for public sale. Similarly, under the 1934 act, securities trading on national exchanges must also be registered. SEC is not authorized to disapprove securities for lack of merit. The SEC must analyze the complaints or indications of violations in securities transactions. All the activities of SEC were specifically designed to help investors.

Self-Regulation: Regulation of the Stock Exchange

The stock exchanges control and monitor the mechanism of the trading practices so as to benefit the investors and to protect the financial system from abusive

and illegal practices. Specifically, NYSE has a rigid set of self regulations and announce that it has provided the most meaningful market regulation in the world. With the help of SEC and other member firms has managed itself as a combined effort. This group combinedly enforces federal legislation and self-regulation for the benefit of investing people. During a typical trading day, the NYSE constantly observes all the participants of the market. It is also responsible to have a watch on the performance of specialists as to whether they are able to full-fill their responsibility fair and organized market in their assigned stocks. The rules and regulations of NYSE are self-imposed and are approved by the SEC. The NYSE has introduced various measures after the occurrences of market crash in 1987 and also the small decline in 1989 to minimize the market volatility and to serve the best interest of investors.

The National Association of Securities Dealers (NASD)

The National association of securities dealers (NASD) is a trade Association which was established with an objective of improving the self regulation of the securities industry. The NASD controls brokers and dealers to protect investors. For the purpose of trade securities, all brokers need to register with the NASD and the NASD maintain record of all the disciplinary actions, taken against the stock broking and securities firms. Information about the individual brokers who is a licence member of the NASD would be available in trading records. Even the information can be disclosed based on the judgements, investigations, regulatory actions, criminal events, and so on.

Other Investor Protections, Insured Brokerage Accounts

The securities Investor Protection corporation (SIFC) is a non profit membership corporation which is responsible for insuring every customer's account of member brokers against the failure of the brokerage firm. It was formed by the congress in 1970. The figures of SIPC has depicted that more than 99 percent of the eligible investors were involved in failed brokerage firm cases.

Mediation and Arbitration

Generally, the investors who is engaged in dispute with brokers cannot claim relief from the court as it will be one of the clauses under terms and conditions he has to accept while according to the cause investors pledge to solve their disputes by mediation or arbitration instead of going to the court. Their exists three stages for the resolution of any problem.

1. Investor must to solve the dispute through brokerage firm. It is necessary to file a written claim and send the required documents to NASDR and investor's state securities regulator.

2. In this stage, mainly compensation or damages will be paid off which is mediated by a voluntary mediator NASDR appoints mediator if needed and decisions made by mediation are non binding.

3. Arbitration is the final stage whose decision needs to be accepted by both the parties. Arbitrator may be an individual or a group of persons who evaluates the evidences and makes rules. Decision on their evidence analysis reports. Arbitration is not freely available, investors need to hire a lawyer

Usually, the final decisions made by the arbitration couldn't be applied unless and until ambiguity is seen if the results are ambiguous, then appeal has to be within three months. Litigation is possible but it is not easy because arbitration clause were signed by the investors.

3.7.2 Recent Trends of Stock Market

Q20. Examine the recent trends in securities market.

Answer :

Many recent trends occurred in stock markets in India. Several institutions were established which provided greater scope for Indian stock markets. These institutions are as follows,

1. **National Stock Exchange (NSE)**

In November 1992, the NSE was established and started dealing with debt instruments such as treasury bills, UTI units, government securities, PSU-bonds and call money, but later the debentures and equities were also included in the list of trading. The headquarters of National Stock Exchange (NSE) is located in Mumbai and it carries out its transactions with the help of screen based online trading system. Its members are spread across the country and are connected through satellite and cables to the system.

2. **Securities Trading Corporation of India (STCI)**

Reserve Bank of India started the STCI with a paid-up capital of ₹ 500 crore. The main aim of STCI is to encourage the growth of secondary market for the government securities and to extend the debt market. At present, the commercial banks and financial institutions are the owners of STCI, as RBI did not took the further responsibility of STCI after 2002.

3. **Securities Exchange Board of India (SEBI)**

SEBI was established with the main objective of regulating the transactions in stock exchange in a fair manner and protect the interest of the investors. It has performed efficiently and there are several achievements to its credit, some of them are as follows,

(i)   Elimination of the control over capital issues and preserving the authority for governing new issues.

(ii) Governing stock exchanges as per the provisions of securities contracts regulation act.

(iii) Making it mandatory for the firms to disclose the material facts and certain risk factors that are related with the projects

(iv) Drawing all the primary and secondary market intermediaries under the regulatory framework.

4.   National Securities Depositary Ltd (NSDL)

During 1996, NSDL was established which started the method of dematerialization process of shares of the participating firms and made an end to process of poor deliveries. The introduction of the depository system was one of the distinct feature of NSDL. In this system, the share certificate is submitted by the shareholder to the issuer firm and there the certificate will be dematerialized in the depository's computerized records, due to which the depositor will become the 'registered owner' of share and the shareholder will become the 'beneficial owner'. This system replaced the paper securities with electronic entry and removed the delays which occurs while settling the securities transactions, due to lost share certificates, electronic entry and the circulation of fake certificates.

3.8 COMPUTATIONAL PROCEDURE OF SENSEX AND NIFTY

Q21. Write the computational procedure of sensex and nifty along with an example.

OR

Describe briefly the Bombay Stock Exchange Sensitive Index (SENSEX) and the S&P CNX Nifty Index (Nifty) and their computational procedure.

Answer :   *(Model Paper-III, Q8(b) | May/June-13, Q4(a))*

In India, a number of stock market indices have been developed but among all those indices S&P CNX nifty index and sensex were the most popular ones.

S&P CNX Nifty

Nifty is one of the rigorously built stock market in India. It represents the price fluctuations of 50 selected stocks based on the market cap and the liquidity. Nifty has selected 1 April, 1995 as the base date and 1,000 as the base value. Nifty is a value weighted index wherein weights of constituents represents the relative market caps of the companies that includes the index.

Sensex

The Bombay Stock Exchange Sensitive Index, usually called as the SENSEX is one of the most famous followed stock market index in India. Sensex basically, indicates the fluctuations of 30 sensitive shares from particularly mentioned and other groups. Sensex is a value weighted index which considers April.1, 1979 as its base date even though it started functioning on January 1, 1986 the value calculated at 598.53 was considered as 100 as base date value) upto the end of August 2003, sensex was being prepared on the basis of full market cap and from September 1, 2003, it was being prepared on the basis of free float market cap. Free float indicates the non-promoter, non-strategic shareholding, the conversion of full market cap was due to the use of global practices.

Both sensex and Nifty are the value weighted indexes. A value-weighted index is that index which represents the total market capitalization of the sample stocks on a particular with reference to the base date. A value weighted index makes an assumption that the investors to invest their money in different stocks of the index. The weights which are allocated to different stocks must be proportional to their market capitalization.

The computation of S&P CNX Nifty based on value-weighted indexes is as follows,

Composition of S&P CNX Nifty as on April 7, 2005

Security	No. of Shares Issued	Close Price (₹ Crores)	Mkt Cap	Weightage
ABB Ltd	42381675	1230	5212.94	0.54
ACC	178533521	364.45	6506.65	0.68
BAJAJ AUTO LTD	101183510	1037.65	10499.3	1.1
BPCL	300000000	366.35	10990.5	1.15
BHARTI TELE- VENTURES	1853366767	209.8	38883.6	4.06
BHEL	244760000	789.25	19317.7	2.01
CIPLA LTD	299870233	252.65	7576.22	0.79
WIPRO LTD	703173637	680.15	47826.4	4.99
ZEE TELE FILMS LTD	412505012	148.6	6129.82	0.64
TOTAL			**958708.28**	

Source: www.nseindia.com

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The table represents the total value of 50 shares of Nifty on 7 April 2005 and the value was ₹ 958708 3 crores. The total market value of all the stocks listed in the NSE at the end of march 2005 constituted nearly 60% of total value of Nifty. The weight of each stock can be computed by dividing the market cap of the stock by the sum of all the fifty stocks. For instance, the weight of Colgate Palmolive (I) Ltd,

$$= \frac{2575.7}{958708.28} = 0.0027 - 0.27\%$$

The closing price on Nov 3, 1995 is regarded as the base period of NIFTY which indicates the completion of one year's operation of the capital market segment of the NSE. The base value is taken as 1000 and base capital is taken as ₹ 2.06 trillion.

As sensex is also a value weighted index it is also computed in the same way as NIFTY. But in sensex, the market capitalization of each stock is multiplied with free-float factor to achieve the modified market capitalization of the stocks

For instance, let us consider Reliance Industries for computing sensex. The market cap of Reliance Industries on 7 April, 2005 was 78795 91 crores and free float adjustment factor is 0 55. The free float market cap of reliance industries is ascertained by multiplying 0.55 with total market cap of Reliance Industries.

Free-float market cap of Reliance Industries 78795.91×0.55 = 43,337.75 crores.

The total of free-float market cap of all the 30 stocks involved in sensex is ₹ 3,87,067 1 crores against the total market cap i e ₹ 732212.92 crores.

The Final weight of Reliance Industries in sensex is computed by dividing free-float market cap of respective company by total of free-float market cap of 30 stocks.

Weight of Reliance Industries $= \frac{43337\,75}{387067\,10} = 0.112 = 11.2\%$

Computation of Sensex

Name of the Stock	Close Price	No. of Shares	Full Mkt Cap (₹ in Crores)	Free-Float Adj. Factor	Free Float Mkt Cap	Weight in Index(%)
Infosys Techno	2187.30	270,108,040	59080.73	0.8	47264.59	12.21
Reliance Indust	565..45	1,393,508,041	78795.91	0.55	43337.75	11 2
ICICI Bank	408.9	736363056	30109.89	1	30109.89	7 78
ONGC CORPN	892.8	1425933992	127307.39	0.15	19096.11	4 93
TATA STEEL	385.75	553862372	21,365.24	0.75	16023.93	4.14
Dr. Reddy's	748.5	76518949	5727 44	0.75	4295 58	1 11
Maruti Udyog	410.1	288910060	11848.20	0.3	3554.46	0 92
Zee Tele	148.55	412505012	6127.76	0.55	3370.27	0.87
TOTAL			732212.92		387067.10	

Source: www.bseindia.com

Q22. How SENSEX and NIFTY acts as a barometer of India's capital market?

Answer :

SENSEX: The Barometer of Indian Capital Market

BSE has been introduced in India as the first stock exchange in 1875 After its emergence it has significant importance in the Indian capital market. In the year 1986, BSE introduced a share index 'SENSEX' is now considered as barometer of capital market in India. The index number for 'SENSEX' is '100' because its base year is 1978-79 SENSEX selection depends on large, liquid and representative companies are done periodically it is usually based on the closing prices of 30 constituent shares. There is always a price fluctuations in the 30 constituent shares. SENSEX was earlier computed on total market capitalization of a company from Sept., 1.2003 SENSEX are calculated on the basis of 'free-float index'. The weights of different shares are segregated depending upon the market capitalization of freely trading shares. The promoters shares are not included in the index calculation. The SENSEX is now calculated by a method of 'free float market capitalization' The level of index at any time shows the market value related to free float of 30 shares. In order to arrive at market capitalization.

Free float market capitalization = Total shares x free float factor

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The SENSEX mechanism requires current prices of index scripts in order to compute the value of SENSEX every 15 seconds during trading hours. The closing value for SENSEX at the end of the day is computed depending upon the weighted average of all trades in all the 30 shares which are performed at the end of the trading session during last 30 minutes.

The following tab e shows 30 shares of SENSEX consisting of weights, free-float factors and the β factors during August 2009.

Name	Weight	Free-float factor	Beta
ACC Ltd	0.73	0.55	0.68
Bharat Heavy Electricals Ltd.	3.46	0.35	0.95
Bharti Airtel Ltd.	4.93	0.35	0.86
DLF Ltd.	1.57	0.25	1.49
Grasim Industries Ltd.	1.61	0.75	0.70
HDFC Bank Ltd.	4.65	0.85	0.86
Hero Honda Motors Ltd.	1.32	0.50	0.39
Hindalco Industries Ltd.	1.02	0.65	1.19
Hidustan Unilever Ltd.	2.47	0.50	0.40
Housing Development Fin. Corpn. Ltd.	5.53	0.90	1.15
ICICI Bank Ltd.	7.28	1.00	1.55
Infosys Technologies Ltd.	9.07	0.85	0.68
ITC Ltd.	5.33	0.70	0.49
Jaiprakash Associates Limited	1.39	0.50	1.74
Larsen & Toubro Ltd.	7.22	0.90	1.15
Mahindra & Mahindra Ltd.	1.57	0.75	1.01
Maruti Suzuki India Ltd.	1.81	0.50	0.66
NTPC Ltd	2.30	0.15	0.67
ONGC Corpn.	4.43	0.20	0.81
Reliance Communications Ltd.	1.64	0.35	1.47
Reliance Industries Ltd.	13.77	0.50	1.20
Reliance Infrastructure Ltd.	1.46	0.65	1.59
State Bank of India	4.35	0.45	1.03
Sterlite Industries	1.67	0.40	1.43
Sun Pharmaceutical Inds. Ltd.	0.86	0.40	0.27
Tata Consultancy Services Limited	2.25	0.25	0.87
Tata Motors Ltd.	1.06	0.55	1.17
Tata Power Co. Ltd.	1.78	0.70	0.90
Tata Steel Limited	2.06	0.70	1.45
Wipro Ltd.	1.41	0.20	1.91
Sensex	1.00		1.00

Table: Sensex Composition, Weights, Free-float Factor and β During August-2009

(i) S&P CNX NIFTY

S&P CNX NIFTY is usually referred as 'NIFTY' NSE established NIFTY with CRISIL on Nov 3, 1995. It is among 50 largest and high y liquid stocks. It is considered as an important indicator of National stock exchange. From July 2009, the method followed by NIFTY is 'free-float capitalization'.

(ii) S&P CNX Defty

S&P CNX Defty is equal to S&P CNX Nifty. The units of measurements for this is U S $ terms. The Nifty and DEFTY has direct impact on each other.

S&P CNX Nifty increased by 2% = Indian stock market increased by 2% and are expressed in rupees.

S&P CNX Defty increased by 2%= Indian stock market increased by 2% and are expressed in US $.

The methodology for calculating S&P CNX Defty is on real time basis.

(iii)   S&P CNX 500

The S&P CNX 500 is considered as India's first broad based benchmark related to Indian capital market and the basis for which is prices of 500 shares. The S&P CNX 500 shows 90% of total market capitalization. 500 companies are allocated in to 72 industries

(iv)   S&P CNX NIFTY Junior

This index is constructed of 50 large, liquid stocks in India it is considered as incubator for rise of stocks. It is also used to build 100 most liquid stocks in India.

(v)   CNX Midcap 200

It is calculated by market capitalization, weighted method. It also considers the continuous charges related to stock splits, right etc. It usually reflexes the total market capitalization of the Index constituents with the base value of 1000.

The constituent necessary for selection of a company are,

(a)   Market capitalization

It is the average 6 months market capitalization of the company. It must vary between ₹ 75 crores and ₹ 750 crores

(b)   Industry Representation

The CNX midcap 200 index shows weightage of industries associated with the midcap segment of the market.

(c)   Trading interest

All constituents related to CNX midcap 200 index should have at least listing record of 6 months. Volumes and trading frequency are considered as evaluated for trading interest of candidates.

(d)   Financial performance

All companies under CNX midcap 200 index have 3 years of operations trading with positive network.

SHORT QUESTIONS AND ANSWERS

Q1. **Price Earnings Ratio**   *(Model Paper-I, Q3 April-17, Q1(e) | Jan.-13, Q1(h))*

OR

P/E Multiplier Approach   *May/June-16, Q1(e)*

OR

Price-Earning Multiplier   *(Dec.-15, Q1(f) | Dec.-14, Q1(f))*

OR

Earnings Multiplier Model

Answer :   *April/May-14, Q1(f)*

Price-earnings ratios are used to estimate the value of the stocks by the investors rather than adopting the discounting models. Every financial magazine and the newspaper at regular interval publish price earnings per share.

The P/E ratio models have three distinct advantages/significance over the discounting models,

1. P/E ratios indicates price per rupee of share earnings. This would help to compare the prices of stocks, which have different earnings per share

2. P/E ratios are helpful in analysing the stocks of the companies that do not pay dividend but have earnings. It should be noted that when there is a loss, the P/E ratio analysis is difficult to use.

3. The variables used in P/E ratio models are easier to estimate than the variables used in the discounting model.

Q2. **Free Cash Flows**

Answer :   *(Model Paper-II, Q2 April-17, Q1(f) April-15, Q1(e))*

Free cash flow is the amount which is distributed among the shareholders and lenders only after the investments made in fixed assets and working capital by the firm to continue its operations. Free cash flow can be evaluated with the help of following key drivers,

FCF = NOPLAT − Net investment

$$= NOPLAT \left[1 - \frac{Net\ Investment}{NOPLAT} \right]$$

$$= Invested\ capital \left[\frac{NOPLAT}{Invested\ capital} \right] \left[1 - \frac{Net\ Investment}{NOPLAT} \right]$$

$$= Invested\ capital \left[\frac{NOPLAT}{Invested\ capital} \right] \left[1 - \frac{Net\ Investment/Invested\ capital}{NOPLAT/Invested\ capital} \right]$$

Where,

Invested capital   The capital which is invested in operating assets which includes fixed assets and net working capital.

$\dfrac{NOPLAT}{Invested\ Capital}$:   It shows the return on invested capital.

$\dfrac{Net\ investment}{Invested\ Capital}$:   It displays the growth rate.

Q3. **What is CAPM and dividend discounted models?**

OR

CAPM   *Dec.-15, Q1(e)*

(Refer Only Topic: CAPM)

OR

Dividend Discounted Models

(Refer Only Topic: Dividend Discounted Models)

Answer :   *(Model Paper-III, Q3 | May/June-16, Q1(f))*

CAPM

An equilibrium model of asset pricing that states that the expected return on a security is a positive linear function of the security's sensitivity to changes in the market portfolios return.

Dividend Discounted Models

Dividend discounted models can be broadly classified for simplicity's sake into,

(i)   Single period valuation models and

(ii)   Multiple-period valuation models.

In these models, the infinite stream of future dividends are valued for the present as price dividends ratio. If the net earnings are assumed to be the same as dividends and no retained earnings, then the price-dividends ratio contracts to price earnings ratio.

Q4.   How to compute stock indices?

Answer :   *Dec.-12/Jan.-13, Q1(f)*

In India a number of stock market indices have been developed but among all those indices S&P CNX nifty index and Sensex are the most popular ones.

For computing stock of nifty of index, following formula is used,

$$\text{Weightage of each stock} = \frac{\text{Market cap of each stock}}{\text{Sum of market cap of all the 50 stocks}}$$

In order to compute the stock of sensex index, the following formula is used.

$$\text{Weightage of each stock} = \frac{\text{Free float market cap of each stock}}{\text{Sum of free float market cap of all the 30 stocks}}$$

$$\text{Free float market cap} = \text{Full market cap} \times \text{Free float adjustment factor}$$

Q5.   State features of common stock.

Answer :   *(Dec.-12/Jan.-13, Q1(e) | May/June-12, Q1(h))*

Following are the features of common stock.

1.   The real owners of any company are the stockholders of common stocks.

2.   **Residual Owners**

Shareholders are usually termed as residual owners on the assets and income of the firm. Because common stockholders' earnings are in the form of dividends which they receive at last, unless and until the board of directors declare.

3.   **Voting**

Shareholders possess the right to vote in the firm's Annual General Meeting (AGM) on a specific matter that has to be discussed in AGM.

4.   **Appointment**

Shareholders appoints Board of Directors (BOD) through voting at the annual general meeting.

5.   **Proxy Fight**

Whenever shareholders are unable to attend the meeting to vote, then another person can vote on behalf of him. This process is usually termed as proxy

Q6.   Dividend capitalization model/capitalization of dividend model.

Answer :

For an equity share, the payments are in the form of dividends, declared by the company

As the equity is a perpetual security i.e , with no maturity date, the dividend payments are made periodically through out its infinite life. So the intrinsic value of a share is represented by the equation.

$$P_0 = \frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \cdots\cdots + \frac{D_n}{(1+k_e)^n}$$

$$= \sum_{t=1}^{n} \frac{D_t}{(1+k_e)^t}$$

Where,

D_t = Dividend payment at time t

k_e = Equity capitalisation rate

P_0 = Present value of a share.

Q7. What is trading cycle and common stocks?

Answer :

Trading Cycle

Trading in shares is allowed on the trading floor of the exchange on weekdays with the settlement period for 5 days, starting from Monday and end on Friday and this is referred to as Trading cycle. Number of days in a trading cycle will vary from exchange to exchange as these are autonomous bodies.

Common Stocks

Stocks are the form of securities which transfers the ownership of the firm in the form of bonds and debentures.

Q8. Over Priced and Under Priced

Answer : *April-15, Q1(b)*

Over Priced Securities

The securities whose expected return is less than its equilibrium expected return. Equivalently, the securities with negative alpha. These securities impress investors and who therefore are willing to pay a price for them which is not justified by their EPS or P/E ratio.

Under-Priced Securities

The securities whose expected return is greater than its equilibrium expected return. Equivalently, securities with a positive alpha. These securities sell below their book value or the price earning ratio which they deserve.

The reason would be that the industry is out of favour, or the company has current labour problem. Fundamental analysis often identify and recommend such shares before they become fully priced. Companies with undervalued shares are often targets of takeovers as their shares can be cheaply acquired.

Q9. What is retained earnings and economic value added approach?

Answer :

Retained Earnings

Retained earnings are undistributed profits and are represented by uncommitted reserves and surpluses. The companies are not required to pay any dividend on retained earnings.

Economic Value Added Approach

Consulting firm Stern Steward has developed the concept of Economic Value Added. EVA is a useful tool to measure the wealth generated by a company for its equity shareholders. In other words, it is a measure of residual income after meeting the necessary requirements for funds.

EVA = Net operating profit after tax – Cost charges for capital employed.

Q10. What is meant by stock dividend and stock split?

Answer :

Stock Dividend

Stock dividends ranks next to cash dividends in respect of their popularity. In this form of dividends, the firm issues additional shares of its own stock to the stockholders in proportion to the number of shares held in lieu of cash dividends.

The payment of stock dividends neither affects cash and earnings position of the firm nor its ownership of stock holders changed. Indeed there will be transfer of the amount of dividend from surplus account to the capital stock account which is tantamount to capitalization of retained earnings.

Stock Split

A stock split is a change in the number of outstanding shares of stock achieved through a proportional reduction or increase in the par value of the stock.

Only the par value and number of outstanding shares are affected. The amounts in the common stock contributed and retained earnings accounts do not change.

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EXERCISE PROBLEMS

1. Y company's equity shares is expected to provide a dividend of ₹ 2 per share and fetch a price of ₹ 18 a year hence. What price would it sell now, if the investors expected rate of return is 12%?

(Ans: The current price of the share is ₹ 17.85).

2. The Jackson corporation has a required rate of return of 16% and its current dividend is ₹ 3 per share. If the current price is ₹ 55 per share. What is the growth rate of its dividend?

(Ans: The growth rate of its dividend would be 10%).

3. The Logan corporation currently has earnings that are ₹ 4 per share. In recent years, earnings have been growing at a rate of 5% and will continue in future. If 40% is the retention rate and required rate of return is 14%, what is its current value?

(Ans: The current value of a share is ₹ 28).

4   Antique arts company would pay ₹ 2.50 as dividend per share for the next year and expected to grow indefinitely at 12%. What would be the equity value if the investor requires 20% return?

(Ans: ₹ 31.25).

5. Big Bull Limited has announced a dividend of ₹ 2.50 per share which is covered four times by earnings. The share is quoted at ₹ 150. What is its P/E multiplier?

(Ans: The P/E multiplier of Big Bull Limited is 15 times).

INTERNAL ASSESSMENT

I. **Multiple Choice**

1. The essential features of common stock are _____. [ ]

   (a) Residual owners

   (b) Proxy fight

   (c) Preemptive Rights

   (d) All the above

2. Dividend capitalization model is classified into _____ [ ]

   (a) Single-period valuation models

   (b) Multiple-period valuation models

   (c) Both (a) and (b)

   (d) Infinite period valuation models

3. In constant growth model, p_0 = _____ [ ]

   (a) $D_1(k-g)$

   (b) $\dfrac{D_1}{k-g}$

   (c) $\dfrac{(k-g)}{D_1}$

   (d) None of the above

4. The relationship between an asset's return and its systematic risk is expressed by _____ [ ]

   (a) CAPM

   (b) P/E ratio

   (c) H-Model

   (d) Gordon Model

5. The securities whose expected return is less than its equilibrium expected return is known as _____. [ ]

   (a) Underpriced securities

   (b) Fairly priced securities

   (c) Overpriced securities

   (d) None of the above

6. The benefits of security market indexes are _____. [ ]

   (a) Benchmarking

   (b) Forecasting

   (c) Economic studies

   (d) All the above

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7. The total market value of nearly 6000 plus US head quartered stocks which are traded on major exchanges is represented by _____.   [ ]

   (a) NASDAQ Composite Index

   (b) Wilshire 5000 Index

   (c) Russell 3000 Index

   (d) Standard and Poor's 500 Index

8. The stock market which indicates the price changes of 50 stocks depending on the basis of market cap and liquidity is _____.   [ ]

   (a) Nifty

   (b) Sensex

   (c) Foreign Stock Exchange

   (d) None of the above

9. The approaches used for the valuation of common stocks are _____.   [ ]

   (a) Balance Sheet Model

   (b) Dividend capitalization model

   (c) Both (a) and (b)

   (d) Walter Model

10. The techniques used for relative valuation are _____.   [ ]

   (a) Price-earning ratio

   (b) Price-sales ratio

   (c) Price-book value ratio

   (d) All the above

II. Fill in the Blanks

1. _____ is an authorised official document which confirms the ownership in an organisation.

2. _____ system allows the other shareholders to vote on behalf of those shareholders who miss their meetings is

3. The analysis of risk and return of holding a particular common stock is known as _____

4. Dividend capitalization Model is also known as _____

5. _____ are used to estimate the value of the stocks by the investors rather than following the discounting models.

6. An equilibrium model which is used for measuring the risk-return trade-off for all assets is _____

7. Price to Book value Ratio = _____

8. _____ indicates the fluctuations of 30 sensitive shares from specified and non-specified groups.

9. _____ is the model which assumes that the dividend per share grows at a constant rate

10. A change in the number of outstanding shares of stock achieved through a proportional reduction or increase in the par value of the stock is _____

KEY

I.   Multiple Choice

1.   (d)

2.   (c)

3.   (b)

4.   (a)

5.   (c)

6.   (d)

7.   (b)

8.   (a)

9.   (c)

10. (d)

II.   Fill in the Blanks

1.   Common Stock

2.   Proxy

3.   Equity valuation

4.   Capitalization of income method

5.   Price-earnings ratios

6.   Capital-Asset Pricing Model

7. $\dfrac{\text{Market Price per Share at Time 'Y'}}{\text{Book Value per Share at Time 'Y'}}$

8.   Sensex

9.   Gordon Model

10. Stock Split

III.   Very Short Questions and Answers

Q1.   What do you mean by a Common Stock?

Answer :

Stocks are the form of securities which transfers the ownership of the firm in the form of bonds and debentures.

Q2.   What is Price to Book Ratio (PBR)?

Answer :

PBR is the ratio of price per share divided by the book value per share.

$$PBR = \frac{\text{Price per share}}{\text{Book value per share}}$$

Q3.   What are Over Priced Securities?

Answer :

The securities whose expected return is less than its equilibrium expected return. Equivalently, the securities with negative alpha. These securities impress investors and who therefore are willing to pay a price for them which is not justified by their EPS or P/E ratio.

Q4.   Write a note on Constant-Growth Model.

Answer :

A type of dividend discount model in which dividends are assumed to exhibit a constant growth rate. This model helps to determine price of stock when the analyst is able to predict all the three variables in the equation namely,

1.   Next year's dividend,

2.   The firms long term growth rate,

3.   The required rate of return of the investor.

Q5.   Write a note on P/BV.

Answer :

The book value of each share is the net value of the company (i.e., Assets − Liabilities) which are divided by the number of issued equity shares. Accounting conventions and economic events are being used for ascerting the book value. While the market price of the share is ascertained by the manner in which the market evaluates its earning power

UNIT
4

Portfolio Theory

INTRODUCTION

An investment process comprises two activities i.e., security analysis and portfolio selection. Here, portfolio can be selected with the help of portfolio theory. The portfolio theory was developed by Harry Markowitz in 1950's in order to quantify the risk of a portfolio and develop a methodology for identifying an optimal portfolio.

Capital market theory is referred as an "Economic equilibrium theory" which is related to asset valuation. This theory takes into account all marketable investments such as stocks, bonds, warrants, options, commodities, etc., and at the same time it also explain how the prices of marketable investments should behave.

Arbitrage pricing theory is one of the powerful new investments theory which was introduced in 1976 but was not popular till past few years. It is a comprehensive theory which involves different risk factors and also includes CAPM as a special case. APT is simple as it can be developed from most modest assumptions relating to underlying utility function and the probability distribution of assets returns

4.1 CONCEPT OF PORTFOLIO, PORTFOLIO RETURN AND RISK

Q1. Define the terms,

(a) Portfolio

(b) Portfolio risk and return.

Answer :

(a) Portfolio

Investing in securities such as shares, debentures and bonds is profitable as well as exciting it is indeed rewarding, but involves a great deal of risk and calls for scientific knowledge as well as artistic skills.

In such investments, both rational as well as emotiona responses are involved. Investing in financial securities is now considered to be one of the best avenues for investing one's savings while it is acknowledged to be one of the most risky avenues of investment It is rare to find investors investing their entire savings in a single security Instead, they tend to invest in a group of securities. Such a group of securities is called Portfolio. Creation of a portfolio helps to reduce risk without sacrificing returns.

An investor invests his funds in a portfolio expecting to get a good return consistent with the risk bearing capacity. Hence, portfolio formation is the most important part of investment decision making.

(b) Portfolio Risk and Return

Portfolio Risk

Risk is defined as variability of return from a portfolio The variability of return is measured with variance and standard deviation.

The variance of returns for a portfolio of assets can be calculated with the following general formula

$$\sigma_p^2 = \sum_{i=1}^{n} \sigma_i W_i^2 + \sum_{i=1}^{n} \sum_{j=1}^{n} \sigma_{ij} W_i W_j$$

Where W_i and W_j are the weights for assets i and j, σ_{ii} is the variance for the ith asset, σ_{ij} is the covariance of assets i and j and n denote number of assets.

The square root of the variance is the portfolio's standard deviation of returns (σ_p)

The portfolio standard deviation of X and Y is,

$$= \sqrt{\sigma_X^2 W_X^2 + \sigma_Y^2 W_Y^2 + 2\rho_{XY} \sigma_X \sigma_Y W_X W_Y}$$

Portfolio Return

The return on a portfolio is simply the weighted average return, a portfolio return can be calculated with the following equation,

$$r_p = \sum_{i=1}^{n} W_i r_i$$

Where,

W_i is the weight of asset i and

r_i is the return for asset i

PROBLEM

1. Ansari got the following information regarding his favorite stocks. He wants to invest in all the four stocks equally.

Stocks	α	β	σ
1	1 27	1.50	50
2	1.02	1.05	40
3	2.48	1.37	20
4	0.47	0.86	36

The market variance is 25 and expected return is 20%.
(i)   What would be Ansari's portfolio return and risk?
(ii)   Can you advise him regarding the amount to be allocated on each security so as to enhance his earnings?

Solution :   *(Model Paper-1, Q9(a) | Dec.-15, Q5(b))*

(i)   **Calculation of Ansari's Portfolio Return**

Portfolio return $= R_p = \sum_{i=1}^{N} X_i(\alpha_i + \beta_i R_m)$

Stock

1   Portfolio return $= 1.27 + 1.50\ (20) = 31.27$ percent
2.   Portfolio return $= 1.02 + 1.05\ (20) = 22.02$ percent
3   Portfolio return $= 2.48 + 1.37\ (20) = 29.88$ percent
4   Portfolio return $= 0.47 + 0.86\ (20) = 17.67$ percent

X_i = Proportion of stock

$R_p = 31.27 \times 0.25 + 22.02 \times 0.25 + 29.88 \times 0.25 + 17.67 \times 0.25$
$= 7.82 + 5.50 + 7.47 + 4.42$
$= 25.21$ Percent

Total risk = Systematic Risk + Unsystematic Risk

Systematic Risk $= \beta^2 \times \sigma_m^2$

Stock

1   Systematic risk $= \beta^2 \times \sigma_m^2 = (1.50)^2 \times 25 = 56.25$
2.   Systematic risk $= \beta^2 \times \sigma_m^2 = (1.05)^2 \times 25 = 27.56$
3.   Systematic risk $= \beta^2 \times \sigma_m^2 = (1.37)^2 \times 25 = 46.92$
4.   Systematic risk $= \beta^2 \times \sigma_m^2 = (0.86)^2 \times 25 = 18.49$

Stock

Unsystematic Risk = Total variance of security return − Systematic Risk

1.   Unsystematic risk $= 146 − 56.25 = 89.75$
2.   Unsystematic risk $= 146 − 27.56 = 118.44$
3   Unsystematic risk $= 146 − 46.92 = 99.08$
4.   Unsystematic risk $= 146 − 18.49 = 127.51$

Total Risk = Systematic Risk + Unsystematic Risk

1. $56.25 + 89.75 = 146$
2. $27.56 + 118.44 = 146$
3. $46.92 + 99.08 = 146$
4. $18.49 + 127.51 = 146$

Portfolio Risk = Variance of the index + Residual variance

Variance of the index (σ_m^2),

$$= \left[\sum_{i=1}^{N} = 1, x_i \beta_i\right]^2 \sigma_m^2 + \left[\sum_{i=1}^{N} = 1(x_i^2 e_i^2)\right]$$

$= (0.25 \times 1.50 + 0.25 \times 1.05 + 0.25 \times 1.37 + 0.25 \times 0.86)^2$
$= (0.375 + 0.262 + 0.342 + 0.215)^2$
$= (1.194)^2$
$= 1.426 \times$ Market return variance
$= 1.426 \times 25 = 35.65$

Residual variance,

$$= \sum_{i=1}^{N} x_i^2 e_i^2$$

$= (0.25)^2\ (50) + (0.25)^2(40) + (0.25)^2(20) + (0.25)^2(36)$
$= 3.125 + 2.5 + 1.25 + 2.25 = 9.125$

$\sigma_p^2 = 35.65 + 9.125 = 44.775$

Hence,

Portfolio return of Ansar = 25.21 percent

Portfolio risk of Ansar = 44.775

(ii) **Calculation of Portfolio Return with Asset Allocation**

(a) 30%, 30%, 20%, 20%

$R_t = 31.27 \times 0.30 + 22.02 \times 0.30 + 29.88 \times 0.20 + 17.67 \times 0.20$

$= 9.381 + 6.606 + 5.976 + 3.534$

$= 25.497$ percent

(b) 20%, 20%, 30%, 30%

$R_t = 31.27 \times 0.20 + 22.02 \times 0.20 + 29.88 \times 0.30 + 17.67 \times 0.30$

$= 6.254 + 4.404 + 8.964 + 5.30$

$= 24.923$ percent

(c) 10%, 40%, 10%, 40%

$R_t = 31.27 \times 0.10 + 22.02 \times 0.40 + 29.88 \times 0.10 + 17.67 \times 0.40$

$= 3.127 + 8.808 + 2.988 + 7.068$

$= 21.991$ percent

The earnings can be enhanced by allocating asset in proportion of 30%, 30%, 20%, 20% which yields 25.5 percent.

2. **From the following information determine the portfolio return and risk with an investment proposition of 60% and 40% respectively.**

Year	2011	2012	2013
Stock-X	14%	16%	20%
Stock-Y	12%	18%	15%

Solution :   *April/May-14, Q5(b)*

Years	Return (%)	
	X	Y
2011	14	12
2012	16	18
2013	20	15

. Combined portfolio return $= \sum_{i=1}^{N} X_i R_i$

$$R_p = X_x R_x + R_y X_y$$

Expected rate of return $= \dfrac{\Sigma R}{N}$

Returns of stock-X $= \dfrac{14+16+20}{3}$

$= 16.67\%$

Returns of stock-Y $= \dfrac{12+18+15}{3}$

$= 15\%$

Portfolio return $= \sum_{i=1}^{N} X_i R_i$

$$R_p = X_x R_x + R_y X_y$$

$= (0.60 \times 16.67) + (0.40 \times 15)$

$= 10.002 + 6$

$= 16.002$

Standard Deviation of Each Stock

$$\sigma_x = \sqrt{\frac{\sum (R_1 - \bar{R}_2)^2}{N}} \quad \text{or Expected return - Total portfolio return}$$

$$= \sqrt{\frac{(14 - 16.67)^2 + (16 - 16.67)^2 + (20 - 16.67)^2}{3}}$$

$$\sigma_x = 2.5$$

$$\sigma_Y = \sqrt{\frac{\sum (R_m - \bar{R}_m)^2}{N}}$$

$$= \sqrt{\frac{(12 - 15)^2 + (18 - 15)^2 + (15 - 15)^2}{3}}$$

$$\sigma_Y = 2.4$$

Convariance between Two Stocks X and Y

$$COV_{XY} = \frac{N-1}{N} [\sigma_X \times \sigma_Y]$$

$$= \frac{3-1}{3} (2.5 \times 2.4)$$

$$= \frac{2}{3} \times 6$$

$\therefore$ Covariance $XY = 4.0$

Correlation of Co-efficient

$$\gamma_{XY} = \frac{COV_{XY}}{\sigma_X \times \sigma_Y}$$

$$= \frac{4}{2.5 \times 2.4} = 0.7$$

Portfolio Risk

$$\sigma_P = \sqrt{\sigma_X^2 R_X^2 + \sigma_Y^2 R_Y^2 + 2 R_X R_Y (\gamma_{XY} \sigma_X \sigma_Y)}$$

$$= \sqrt{(2.5)^2 (0.60)^2 + (2.4)^2 (0.40)^2 + 2(0.60)(0.40)(0.7(2.5 \times 2.4))}$$

$$= 2.3$$

3. Praveen Gupta has a stock of three companies and ERR and proportionate investment is given below find out the portfolio return.

Stock	ER (Expected Return)	% of Funds Invested
Pasha & Co.	12%	25%
Lakami & Co.	14%	35%
Yadagiri & Co.	18%	40%

What would be the Expected Rate of Return (ERR) if, Gupta changes his proportion in each stock as 25%, 40%, 30% respectively?

Solution : *May/June-12, Q5(b)*

Given that,

Weights of funds invested,

$w_1 = 0.25$

$w_2 = 0.35$

$w_3 = 0.40$

Expected returns are,

$r_1 = 12\%$

$r_2 = 14\%$

$r_3 = 18\%$

(i) Portfolio return, $r_p = (w_1 \cdot r_1) + (w_2 \cdot r_2) + (w_3 \cdot r_3)$

$= (0.25 \times 12) + (0.35 \times 14) + (0.40 \times 18)$

$= 3 + 4.9 + 7.2$

$= 15.1$

$\boxed{\therefore r_p = 15.1\%}$

(ii) If Gupta changed his funds in portfolio to,

$w_1 = 0.25$

$w_2 = 0.40$

$w_3 = 0.30$

Therefore, expected portfolio return, $r_p = (0.25 \times 12) + (0.4 \times 14) + (0.3 \times 18)$

$= 3 + 5.6 + 5.4$

$= 14$

$\boxed{\therefore r_p = 14\%}$

---

4. Aravind stock has a beta of 0.5, Lasya stock has a beta of 1.2 and Reshma stock has a beta of 1.25. If the expected market return is 22% and the risk free rate is 13%.

(i) What would be the expected Return on Aravind?

(ii) What would be the average and expected return on portfolio, if the portfolio consists of 30% of Aravind stocks, 40% of Lasya stocks and 30% of Reshma stocks?

(iii) Compute expected return using part (i).

Solution :   *Jan.-12, Q5(b)*

(i) **Expected Return for Aravind**

$R_a = R_f + \beta_a (R_M - R_f)$

Where,

R_f = Risk free rate = 13%

β_a = Beta = 0.5

R_M = Market return = 22%

$= 13 + 0.5 (22 - 13)$

$= 17.5$

(ii) **Calculation of Portfolio's Expected Return**

$R_p = R_f + \beta_p (R_M - R_f)$

$\beta_p = (\beta_A \times W_A) + (\beta_L \times W_L) + (\beta_R \times W_R)$

$= (0.5 \times 0.3) + (1.2 \times 0.4) + (1.25 \times 0.3)$

$= 0.15 + 0.48 + 0.375$

$= 1.005$

$\therefore$ $R_p = R_f + \beta_p (R_M - R_f)$

Where,

$R_f = 13, \beta_r = 1.005, R_M = 22$

$= 13 + 1.005 \ (22-13)$

$= 13 + 9.045$

$= 22.045\%$

(iii) Expected Return

Lasya,

$R_L = R_f + \beta_R \ (R_M - R_f)$

$= 13 + 1.2 \ (22 - 13)$

$= 13 + 10.8$

$= 23.8$

Reshma,

$R_R = R_f + \beta_L \ (R_M - R_f)$

$= 13 + 1.25 \ (22 - 13)$

$= 13 + 1.25$

$= 24.25$

---

5. Stocks X & Y have yielded the following returns for the past 6 years.

Years	Return (%)	
	X	Y
1ˢᵗ year	12	14
2ⁿᵈ year	18	12

Years	Return X	Return Y
1	12%	22%
2	18%	18%
3	14%	14%
4	22%	10%
5	16%	12%
6	20%	18%

What is the expected return and risk of a portfolio made up of 60% of X and 40% of Y?

Solution :   *Model Paper-III, Q9(a)*

(i) Expected Rate of Return

Expected Rate of Return $= \dfrac{\Sigma R}{n}$

Where,

$\Sigma R =$ Total of return,

$n =$ Number of observations

Returns of Stock $X = \dfrac{12 + 18 + 14 + 22 + 15 + 20}{6}$

$= \dfrac{101}{6} = 16.83$

Returns of Stock $Y = \dfrac{22 + 18 + 14 + 10 + 12 + 18}{6}$

$= \dfrac{94}{6} = 15.67$

Portfolio Return $= \sum_{i=1}^{N} X_i R_i$

$= (0.60 \times 16.83) + (0.40 \times 15.67)$

$= 10.098 + 6.268 = 16.366.$

(ii) Standard Deviation of Each Stock

$\sigma_x = \sqrt{\dfrac{\Sigma(R_1 - \bar{R_1})^2}{N}}$

$= \sqrt{\dfrac{(12-16.83)^2 + (18-16.83)^2 + (14-16.83)^2 + (22-16.83)^2 + (15-16.83)^2 + (20-16.83)^2}{6}}$

$= \sqrt{\dfrac{23.33 + 1.37 + 8.00 + 26.73 + 3.35 + 10.05}{6}}$

$= \sqrt{\dfrac{72.83}{6}}$

$= \sqrt{12.1383} = 3.484$

$\sigma_y = \sqrt{\dfrac{\Sigma(R_2 - \bar{R_2})^2}{N}}$

$= \sqrt{\dfrac{(22-15.67)^2 + (18-15.67)^2 + (14-15.67)^2 + (10-15.67)^2 + (12-15.67)^2 + (18-15.67)^2}{6}}$

$= \sqrt{\dfrac{40.07 + 5.43 + 2.79 + 32.15 + 13.47 + 5.43}{6}}$

$= \sqrt{\dfrac{99.34}{6}}$

$= \sqrt{16.5567}$

$= 4.069$

(iii) Covariance between Stock X and Y

$Cov_{xy} = \dfrac{\Sigma(R_1 - \bar{R_1})(R_2 - \bar{R_2})}{N}$

$= \dfrac{\begin{array}{l}(12-16.83)(22-15.67) + (18-16.83)(18-15.67) + (14-16.83)(14-15.67) + \\ (22-16.83)(10-15.67) + (15-16.83)(12-15.67) + (20-16.83)(18-15.67)\end{array}}{6}$

$= \dfrac{(-4.83 \times 6.33) + (1.17 \times 2.33) + (-2.83 \times (-1.67)) + (5.17 \times (-5.67)) + (-1.83 \times (-3.67)) + (3.17 \times 2.33)}{6}$

$= \dfrac{-30.57 + 2.73 + 4.73 + (-29.31) + 6.72 + 7.39}{6}$

$= \dfrac{-38.31}{6} = -6.385$

(iv) Correlation Coefficient

$r_{xy} = \dfrac{Covariance_{xy}}{\sigma_x \cdot \sigma_y}$

$= \dfrac{-6.385}{3.484 \times 4.069}$

$= \dfrac{-6.385}{14.176}$

$= -0.45$

(v) Portfolio Risk

$\sigma_p = \sqrt{(X_1)^2(\sigma_x)^2 + (X_2)^2(\sigma_y)^2 + 2X_1 X_2(r_{xy}\sigma_x\sigma_y)}$

$\sigma_p = \sqrt{(0.60)^2(3.484)^2 + (0.40)^2(4.069)^2 + (2 \times 0.60 \times 0.40) \times (-0.45 \times 3.484 \times 4.069)}$

$= \sqrt{(0.36 \times 12.14) + (0.16 \times 16.56) + (0.48) \times (-6.38)}$

$= \sqrt{4.37 + 2.65 + (-3.06)}$

$= \sqrt{3.96}$

$= 1.99.$

4.1.1 Process of Portfolio Management

Q2. Explain various steps involved in the process of portfolio management.

Answer :

Process of Portfolio Management

We own portfolios because we believe that investment risk can be diversified by spreading our investment across a number of assets. Ideally, we would like to own a portfolio which provides the maximum return for a given level of risk. Portfolio management is primarily concerned with the process of building and managing such portfolios.

We will define portfolio management as an ongoing process consisting of the following integrated set of steps.

(a) Specification of Investment Objectives, Constraints and Investment Policies

The first step in the process of portfolio management is to define the objectives of the investor in terms of return requirements and risk tolerance. Clearly, the objectives have to be framed in the context of constraints such as liquidity, time horizon, tax status and legal or regulatory considerations. Given the set of investment objectives and constraints, the investment policy for the investor is evolved. The investment policy specifies the actions to be taken to achieve the investment objectives within the constraints imposed.

(b) Forecasting Exceptional Inputs

This step involves forecasting measures of risk and return for the major asset classes like equities, bonds, money market securities and real estate.

The step begins with the identification of the macroeconomic variables that are relevant for assessing the risk return characteristics of each asset class and forming expectations about these variables. It culminates in translating the expectations into measures of risk and return.

(c) Asset Allocation

Given an investment policy and the expectational inputs, decisions have to be made regarding.

1. The key asset classes in which funds can be invested equities, bonds, money market instruments, real estate, etc.

2. The amount of money to be invested in each asset class. Within each asset class, decisions are made concerning,

   (i) The securities that must belong to the class

   (ii) The amount of money to be invested in each one of these securities.

Ideally, the portfolio must be a minimum variance portfolio. A portfolio that carries the minimum level of risk for a given level of return.

(d) Managing the Portfolio

Having constructed a portfolio, the next step will be to manage the portfolio using active or passive or a combination of active and passive strategies. One can think about these styles of portfolio management as lying along a spectrum of risk taking with all portfolio managers along that spectrum having defined benchmarks

The passive portfolio manager takes little, if any, risk vis-a-vis that benchmark. His sole objective is to equal the return of the benchmark.

On the other hand, the active portfolio manager does take risk in terms of market timing and stock selection because only by taking risk one can hope to add incremental return.

(e) Monitoring and Rebalancing the Portfolio

Regardless of the strategy followed for managing the portfolio (active/passive), the portfolio manager must ensure that the portfolio remains appropriate to the ever changing environment

The factors that can change include changes in the investment objectives and constraints, changes in the risk attributes or return prospects for individual investments and emergence of new investment alternatives.

The portfolio manager must monitor these changes and respond by rebalancing the portfolio to accommodate these changes.

(f) Evaluating Portfolio Performance

This step involves measuring the risk adjusted performance of a portfolio in order to evaluate the investment strategy that has been developed based on investor objectives. While, there are a number of risk adjusted performance measures available for evaluating the performance of a portfolio.

Modern Portfolio Theory

The Modern Portfolio Theory (MPT) provides the conceptual frame for the portfolio management process.

The theory primarily deals with the framework for identifying the composition of efficient portfolios – portfolios which carry the minimum levels of risk for different levels of expected return
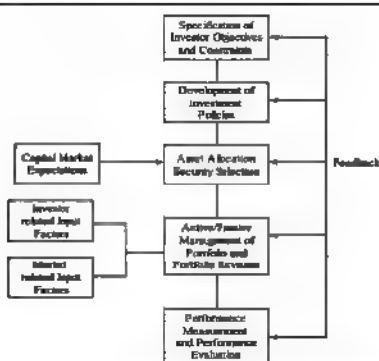
Figure: Portfolio Management Process

4.2 HARRY MARKOWITZ'S PORTFOLIO THEORY

Q3. What is Markowitz Theory? State its assumptions and significance.

Answer :

Markowitz Theory

Harry M Markowitz is credited by introducing new concept of risk measurement and their application to the selection of portfolios. He started with the idea of risk aversion of investors and their desire to maximise expected return with the least risk.

Markowitz model is a theoretical framework for analysis of risk and return and their relationships. He used statistical analysis for the measurement of risk and mathematical programming for selection of assets in a portfolio in an efficient manner. His framework led to the concept of efficient portfolios, which are expected to yield the highest return for a given level of risk or lowest risk for a given level of return.

Risk and return are two aspects of investment considered by investors. The expected return may vary depending on the assumptions. Risk index is measured by the variance or the distribution around the mean its range etc., and traditionally the choice of securities depends on lower variability whereas Markowitz emphasizes on the need for maximization of returns through a combination of securities whose total variability is lower.

The risk of each security is different from that of others and by proper combination of securities, ca ed diversification, one can form a portfolio wherein the risk of one is offset partly or fully by that of the other. In other words, the variability of each security and covariance for their returns reflected through their interrelationship should be taken into account.

Thus, expected returns and the covariance of the returns of the securities within the portfolio are to be considered for the choice of a portfolio.

A set of efficient portfolios can be generated by using the above process of combining various securities whose combined risk is lowest for a given level of return for the same amount of investment, that the investor is capable of the theory of Markowitz, as stated above is based on the number of assumptions

Assumptions of Markowitz Theory

(i) The investor seeks to maximise the expected utility of total wealth.

(ii) All investors have the same expected single period investment horizon.

(iii) Investors are risk averse

(iv) Investors base their investment decisions on the expected return and standard deviation of returns from a possible investment.

(v) Perfect markets are assumed E.g., no taxes and no transaction costs).

A portfolio of assets under the above assumptions is considered efficient by if no other asset or portfolio of assets offers a higher expected return with the same or lower risk with the same or higher expected return

Significance of Markowitz Theory

The significance of Markowitz portfolio theory can be understood from the following points,

1. In the world of uncertainties the investors will not always get profit by possess ng a single stock portfolio with an intention to earn good returns. Markowitz portfolio theory basically emphasizes upon the need for maximising the returns through a combination of either two or more securities, whose total variability is lower

2. This theory primarily focuses upon the efficient portfolios selection, which are expected to yield the highest return for a given level of risk or lowest risk for a given level of return.

3. This model acts as a theoretical framework for analysing the risk and return and their relationships using various statistical tools

4. Markowitz theory takes into account the variability of each security and covariance for their returns shows highlighted through their interrelationship.

Q4. Define Markowitz diversification. Explain the statistical method used by Markowitz to obtain the risk reducing benefit.

Markowitz Diversification

Markowitz postulated that diversification should not only aim at reducing the risk of a security by reducing its variability or standard deviation, but by reducing the covariance or interactive risk of two or more securities in a portfolio.

As by combination of different securities, it is theoretically possible to have a range of risk varying from zero to infinity. Markowitz theory of portfolio diversification attaches importance to standard deviation to reduce it to zero, if possible.

Statical Method Used by Markowitz

The following is the procedure developed by Markowitz for choosing the optima, portfolio of risky assets.

1. Identifying the Optimal Risk-Return Combinations

This is the first step in markowitz's procedure for choosing the optimal portfolio of risky assets. In this step, the investor identifies the optimal risk-return combinations from an available set of risky assets. The investor uses markowitz efficient frontier analysis for this purpose.

Efficient Frontier

For answer refer Unit-IV, Page No. 4.24, Q.No. 16, Topic Efficient Frontier.

Markowitz focuses on three variables for the determination of efficient set of portfolio. They are risk, covariance and coefficient of correlation. This could be explained with the help of the following example,

Suppose, there are two securities and the following information is available.

Security	A	B
Expected return ER % ($\bar{x}$)	25	15
Proportion P %	60	40

Calculation of return

Step 1: Combining the Two Securities to Calculate their Return on the Portfolio

$$\therefore \text{ Combined portfolio return} = \sum_{i=1}^{N} X_i R_i$$

$$R_P = X_A R_A + R_B X_B$$

$$= 0.60 \times 25 + 0.40 \times 15$$

$$= 15 + 6$$

$$= 21\%$$

$\therefore$ The combined portfolio gives a return of 21%.

Step 2: Calculating the Standard Deviation

$$\sigma_A = \text{Expected return} - \text{Total portfolio return}$$

$$= 25 - 21$$

$$= 4\%$$

$$\sigma_B = 15 - 21$$

$$= 6\%$$

Variance of A and B securities are,

$$\sigma_A^2 = (4)^2 = 16$$

$$\sigma_B^2 = (-6)^2 = 36$$

Step 3: Calculating the Covariance between 2 Securities A and B

$$Cov_{AB} = \frac{N-1}{N}[\sigma_A \times \sigma_B]$$

$$= \frac{2-1}{2}[4 \times (-6)]$$

$$= \frac{1}{2}[-24]$$

$$= -12$$

$\therefore$ Covariance $= -12$

Step 4: Calculating the Correlation Coefficient

$$\gamma_{AB} = \frac{Cov_{AB}}{\sigma_A \sigma_B}$$

$$= \frac{-12}{4 \times (-6)}$$

$$= \frac{+12}{-24} = \frac{1}{2} = 0.5$$

$\therefore$ Correlation coefficient $\gamma_{AB} = 0.5$

Choose the Final Portfolio

The investor then has an option to select a portfolio which yields a higher return.

However, in the above example the investor should calculate the portfolio risk for 2 securities as follows,

$$P = \sqrt{\sigma_A^2 R_A^2 + \sigma_B^2 R_B^2 + 2R_A R_B(\gamma_{AB}\sigma_A\sigma_B)}$$

$$= \sqrt{(4)^2(0.60)^2 + (-6)^2(0.40)^2 + 2(0.60)(0.40)[(+0.5)(4)(-6)]}$$

$$= \sqrt{5.76 + 5.76 - 5.76}$$

$$= \sqrt{5.76} = 2.4$$

$\therefore$ Portfolio risk $= +2.4$

4.3 CONSTRUCTION OF MINIMUM RISK PORTFOLIO

Q5.   What are the various steps that must be adopted to construct a portfolio having minimum risk?

Answer :

Sharpe had provided a model for the selection of appropriate securities to construct a portfolio which is known as Sharpe's optimal portfolio. The selection of any stock is directly related to its excess return beta ratio,

$$\frac{r_i - r_f}{\beta_i}$$

Where,

r_i = The expected return on stock i

r_f = The return on a riskless asset

β_i = The expected change in the rate of return on stock i associated with on unit change i the market return.

The excess return is the differences between the expected return on the stock and the riskless rate of interest. Such, as the rate offered on the government security or treasury bill. The excess return to beta ratio measures the additional return on a security (excess of the riskless asset return) per unit of systematic risk or non-diversifiable risk. This ratio provides a relationship between potential risk and reward.

Ranking of the stocks are done on the basis of their excess return to beta. Portfolio managers would like to include stocks with higher ratios. The selection of the stocks depends on a unique cutoff rate such that all stocks with higher ratio of $\frac{r_i - r_f}{\beta_i}$ are included and the stocks with lower ratios are left off, the cut-off point.

The steps for finding out the stocks to be included in the optimal portfolio are given below,

1. Find out the "excess return on beta" ratio for each stock under consideration.

2. Rank them from the highest to the lowest.

3. Proceed to calculate C_i for all the stocks according to ranked order using the following formula.

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^{n} \frac{(r_i - r_f)\beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^{n} \frac{\beta_i^2}{\sigma_{ei}^2}}$$

Where,

σ_m^2 = Variance of the market index

σ_{ei}^2 = Variance of a stock's movement that is not associated with the movement of market index i.e., stock's unsystematic risk.

Construction of the Optimal Portfolio

After determining the securities to be selected, the portfolio manager should find out how much should be invested in each security. The percentage of funds to be invested in each security can be estimated as follows,

$$X_i = \frac{Z_i}{\sum_{i=1}^{n} Z_i}$$

Where, $Z_i = \frac{\beta_i}{\sigma_{ei}^2}\left[\frac{r_i - r_f}{\beta_i} - C^*\right]$

The first expression indicates the weights on each security and they sum upto one. The second shows the relative investment in each security. The residual variance or the unsystematic risk has a role in determining the amount to be invested in each security.

Difference Between Sharpe Index Model and Markowitz Model

	Sharpe Index Model		Markowitz Model
1	Sharpe Index model was developed by william sharpe	1	Markowitz model was developed by Harry M.Markowitz.
2	It is also known as single index model.	2.	It is also known as mean-variance model
3.	The formula for calculating sharpe ratio is $S_p = \frac{\text{Risk Premium}}{\text{Total risk}} = \frac{r_p - r_f}{\sigma_p}$	3.	The formula for calculating optimum portfolio of two securities is $P = \sqrt{\sigma_A^2 R_A^2 + \sigma_B^2 R_B^2 + 2R_A R_B(\gamma_{AB}\sigma_A \sigma_B)}$
4.	It depicts the relationship between each security returns to market index returns.	4.	It depicts the relationship between risk and return.
5.	One of the assumption of this model is that the portfolio under consideration is the whole or substantially the whole of the investors total portfolio.	5.	One of the assumption of this model is that all investors have the same expected single period investment horizon.

4.3.1 Minimum Variance Portfolio

Q6. What is minimum variance portfolio? Explain with an example.

Answer :

Minimum Variance Portfolio

The change in portfolio proportions of assets can change portfolio risk. By skilful balancing of the investment proportions in different securities, the portfolio risk can be brought down to zero. Such a portfolio is termed as minimum variance portfolio.

In a two asset portfolio composed of assets "a and b", the minimum risk portfolio requires an investment in asset "a" equal to X_a

Where, $X_a = \dfrac{\sigma_b^2 - \rho_{ab}\sigma_a\,\sigma_b}{\sigma_a^2 + \sigma_b^2 - 2\rho_{ab}\sigma_a\,\sigma_b}$

If the correlation coefficient is less than the ratio of smaller standard deviation to larger standard deviation, then the combination of two securities provides a lesser standard deviation of return than when either of the security is taken alone.

Example

The Splendor (s) and Kinetic (k) corporations have the following risk and return characteristics,

$r_s = 16\%$, $\bar{r}_k = 14\%$, $\sigma_s = 25\%$, $\sigma_k = 22\%$, $\rho_{ks} = 0.5$.

Determine the minimum risk portfolio.

Solution :

The proportion to be invested in each security can be found out by,

$$X_a = \frac{\sigma_b^2 - \rho_{ab}\sigma_a\,\sigma_b}{\sigma_a^2 + \sigma_b^2\; 2\rho_{ab}\sigma_a\,\sigma_b}$$

Let,

$k = a$ and $s = b$ results in,

$$X_s = \frac{(25)^2\;\;(0\,5)(22)(25)}{(22)^2 + (25)^2\;\;[2(0.5)(22)(25)]}$$

$$= \frac{625 - 275}{484 + 625 - 550} = \frac{350}{559}$$

$= 0.6261$ or $62\,61\%$ (for k)

∴ Investment in Kinetic corporation $= 62.61\%$ and in Splendor,

$X_s = 1 \quad X_a = 1 \quad 0.6261 = 0.3739 = 37\,39\%$

If correlation coefficient is perfectly $+1$, 0, -1, the above formula for weight can be rewritten as follows,

$\rho_{ab} = +1$

$X_s = \dfrac{\sigma_b^2 - \rho_{ab}\sigma_a\,\sigma_b}{\sigma_a^2 + \sigma_b^2 - 2\rho_{ab}\sigma_a\,\sigma_b}$

$\rho_{ab} = 0$

$X_s = \dfrac{\sigma_b^2}{\sigma_a^2 + \sigma_b^2}$

$\rho_{ab} = 1$

$X_s = \dfrac{\sigma_b}{\sigma_a + \sigma_b}$

Q7 Explain the concept of single index model with an example.

Answer :

Single index model is a portfolio selection approach developed by William Sharpe. It depicts the relationship between each security returns to market index returns. S and P 500 can be considered as a good example of market index. Therefore, single index model,

$$R_i = a_i + \beta_i R_m + e_i$$

Where,

R_i = Security is return

R_m = Market index return

a_i = Return on security i which is separate and not connected with the performance of market

β_i = Calculates an expected change of R_m and R_i. R_m is an independent variable whereas R_i is a dependant variable. It is a constant variable

e_i = It is a residual error which is random.

Single index model segregates the rate of return of security into micro and macro events. A micro event is a firm-specific or unique risk which effects only to a particular company. It is independent from market and denoted as a_i. For example, strikes, occurrence of fire etc.

In contract, macro event is a systematic risk which effects to nearly all companies. It is dependent, related to market and denoted by $\beta_i R_m$.

Assumptions

1. Residual error and market index are not correlated.

2. The outcome of error terms for securities i and j are not correlated to each other

   This can also be written as,

   $cov(e_i, e_j) = 0$
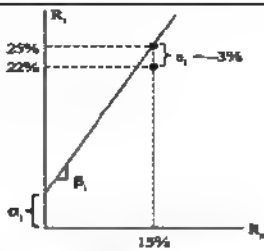
3. If the response is common in two securities when compared to market index, then the returns of two securities would be correlated Whereas, the outcome of error terms for securities i and j are not correlated to each other

   This can also be written as, $cov(e_i, e_j) = 0$

   $R_i = a_i + \beta_i R_m + e_i$ for security i and

   $R_j = a_j + \beta_j R_m + e_j$ for security j

Figure

If even anyone of these two assumptions have not been explained in practical manner, then this model would be inappropriate.

Examples

Change in discount rate and changes in the supply of money which is unexpected.

By comparing the difference between the values of right hand side and left hand side, a error term is achieved. These values are the difference between actual and expected returns on security r.

Only the market risk alone influences the covariance of two securities. Therefore, if the response of two securities are common with the market index then covariances of two securities are correlated and it is derived as,

$$\sigma_{ij} = \beta_i \beta_j \, \sigma_m^2$$

If the residual error is correlated then again, this model becomes inaccurate and a multiple index model has to be selected.

In order to reduce risk, this model has segregated the covariance return of each security in two parts which are market risk and unique risk.

$$\sigma_i^2 = \beta_i^2 [\sigma_m^2] + \sigma_{ri}^2$$

Where, σ_i^2 = Total risk

$\beta_i^2 [\sigma_m^2]$ = Systematic risk

σ_{ri}^2 = Firm specific risk.

Market risk effects to the returns of all firms and hence also termed as systematic risk whereas unique risk is subjected to a particular firm. Therefore, it can also be termed as firm specific risk. This is applicable to even portfolio also.

∴ Portfolio of minimum variance,

$$\sigma_p^2 = \beta_p^2 [\sigma_m^2] + \sigma_{rp}^2$$

Where, σ_p^2 = Total portfolio variance

$\beta_p^2 [\sigma_m^2]$ = Portfolio market risk

σ_{rp}^2 = Portfolio residual risk

Q5. Explain the Sharpe Index model. How does it differ from the Markowitz model?

Answer : *(Model Paper-II, Q9(a) | Dec.-15, Q5(a))*

Sharpe Index Model

For answer refer Unit-V, Page No. 5.2, Q No. 1, Topic Sharpe's Reward to Variability Index

Difference Between Sharpe Index Model and Markowitz Model

	Sharpe Index Model		Markowitz Model
1.	Sharpe Index model was developed by william sharpe	1	Markowitz model was developed by Harry M.Markowitz.
2	It is also known as single index model	2	It is also known as mean-variance model
3	The formula for calculating sharpe ratio is $$S_r = \frac{\text{Risk Premium}}{\text{Total risk}} = \frac{r_p - r_f}{\sigma_p}$$	3	The formula for calculating optimum portfolio of two securities is $P = \sqrt{\sigma_A^2 R_A^2 + \sigma_B^2 R_B^2 + 2R_A R_B(y_{ab}\sigma_A \sigma_B)}$
4	It depicts the relationship between each security returns to market index returns.	4.	It depicts the relationship between risk and return.
5.	One of the assumption of this model is that the portfolio under consideration is the whole or substantially the whole of the investors total portfolio.	5.	One of the assumption of this model is that all investors have the same expected single period investment horizon.

PROBLEM

1. **Market index return for period**
   $t = 15\%$, $a_i = 4\%$, $\beta = 1.4$
   Calculate return for stock i using single index model.

Solution :

Single index model is,

$R_i = a_i + \beta_i R_m + e_i$
$\quad = 4\% + (1.4)(15\%)$
$\quad = 4\% + 21\%$
$\quad = 25\%$

∴ Expected return for stock $i = 25\%$

If suppose, the actual return on stock i 22%

Then the error term = Actual return   Expected return
$\qquad\qquad\qquad = 22\%\quad 25\%$
$\qquad\qquad\qquad = -3\%$

The term beta (β) plays a pivotal role in knowing to what extent, a particular stock is sensitive when it is compared with market.

4.4 CAPITAL MARKET THEORY

Q9.   What is capital market theory of portfolio? State its assumptions

Answer :

Capital Market Theory

Capital market theory is an extension of the portfolio theory of Markowitz. The portfolio theory explains how rational investors should build efficient portfolio based on their risk-return preferences. Capital Asset Pricing Model (CAPM) incorporates a relationship, explaining how assets should be priced in the capital market.

Assumptions of Capital Market Theory

Capital market theory consist of the following assumptions,

1   Investors are expected to make decisions based solely on risk return assessments (expected returns and standard deviation measures).

2   The purchase and sale transactions can be undertaken in infinitely divisible units.

3   Investors can sell short any number of shares without limit

4   There is perfect competition and no single investor can influence prices, with no transaction costs involved.

5.   Personal income taxation is assumed to be zero.

6.   Investors can borrow/lend the desired amount at risk.ess rates.

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4.4.1 Introduction of Risk-free Asset

Q10. Define risk free Asset. Discuss in brief regarding allowing for risk-free lending and allowing for risk-free Borrowing.

Answer :

Risk Free Asset

According to the assumptions of capital market theory, Investor have a lot of chance to borrow or lend the money at a risk free rate of return. Determination of the free rate is one of the most important step in the development of portfolio and CMT theories.

Risk free asset is defined as "the asset whose return is certain with a zero variance of return"

The concept of risk free asset is an extension of Markowitz's approach of investment. According to the theory of Risk free asset, the investors used to invest some part of their investment in risk free assets whereas the remaining is invested in risky portfolios or assets. Risk free rate of Markowit'z approach helps an investor to borrow or lend the money at a risk free rate. This may result in changing the concept of efficient frontier paving the path for the development of a general theory for pricing the assets under uncertain market conditions.

As, the risk free asset is characterized by the zero standard deviation of the return, then there will not be uncertainties associated with the return on the investment. Thus, the variation is also equal to zero. Similarly, the covariance between the returns on both the risk free asset and risky assets becomes equal to zero. Practically, the product of correlation coefficients of assets and standard deviations is given by,

$$\sigma_{ij} = P_{ij}\,\sigma_i\,\sigma_j$$

Where,

σ_i, σ_j are standard deviations for assets i and j

i, j are the assets

P_{ij} is the correlation coefficient of 2 assets

As standard deviation of asset 'i' σ_i is 0 the covariance also becomes zero.

$$\sigma_{ij} = P_{ij}\; 0\; \sigma_j$$
$$\sigma_{ij} = 0$$

The treasury bills which have a maturity period of far more or less than the investor's holding period does not qualify as risk free assets as they involve some amount of risk. Such as interest rate and reinvestment-rate risk, whereas the treasury bills with a maturity period equal to the investor's holding period can be treated as risk free assets.

The risk free assets are a type of fixed income securities that don't involve any risk and should be issued only by federal government but not by any corporation.

Risk Free Lending

According to Markowitz's approach, an investor needs to invest part of his/her investment into the risk free asset whereas the remainder gets invested into the risky portfolios

The set of portfolio and in this case are called "Markowitz's feasible set" with an increase in the number of opportunities the portfolio's in the feasible set has been increasing causing the changes in the location of the efficient set of Markowitz's portfolio.

In order to select the best portfolio the investor should analyses the nature of these changes by determining the expected rate of return and the standard deviation of a portfolio.

The investors can invest in both risk free assets and risky assets combinedly. However, he is having two alternatives,

(i)   He can either invest in both risk free assets and a single risky asset

(ii)   He can invest in the risk free asset and also the risky portfolio.

Both these alternatives can be dealt in detail,

(i)   Investing in both Risk Free Asset, and Single Risky Assets

Let us consider an investor investing in both the risk free asset and risky asset. Assume I_1 be the investment in the risky asset and I_2 be the investment in the risk free asset which can be determined by using the relation.

$$I_2 = 1 - I_1$$

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It is not advisable to invest all the investment in risk free assets i.e., $I_1 = 0$ and $I_1 = 1$. The various possible alternatives are,

Portfolio	I_1	I_2	Expected Return	Standard Deviation	$X_1 r_1$
(1)	0	1	5.00%	0.00%	0
(2)	0.25	0.75	8.05%	3.5%	24.55
(3)	0.50	0.50	12.00%	7.00%	884
(4)	0.75	0.25	14.15%	9.15%	129.47
(5)	1.00	0.00	17.20%	12.20	209.84

Table

The expected return can be calculated by using the formula

$$r_p = \sum_{i=1}^{N} \bar{X} \ r_i$$

Let us assume the risk free asset's rate of return is 5% then,

$$\bar{r}_p = \sum_{i=1}^{3} X_i \ r_i$$
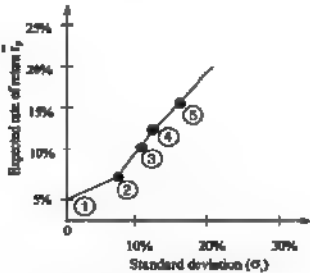
Figure

It is clear that the expected rate of return will increase with a combination of investments in both risk free and risky assets.

(ii) Investment in Risk Free Asset and Risky Portfolio

Investors can invest their investment in risk free asset as well as in the risky portfolio rather than in a single risky asset. In a set of Markowitz portfolio's, the PQ line is the efficient frontier and at a risk free rate of 5%. Draw the straight lines passing through the set of frontier line. Draw a tangent line to the efficient frontier PQ which touches it at a tangent point (R). The portfolio at that point 'R' is said to be an efficient set of securities. At a point R, investor can achieve higher rate of returns.
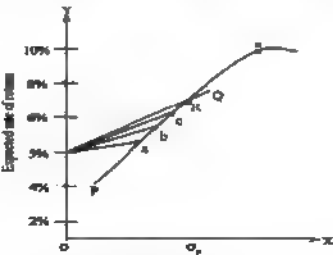
Figure

Any portfolio beyond the point 'R' will not yield more returns

If the investor is a high risk averse then he will invest only in the portfolio at the point of 'R'. If he is less risk averse he will be able to invest in the portfolio at the points 'R' and 'S'. The portfolio at the point 'S' is associated with more risks and returns.

Risk Free Borrowing

The act of an investor in making use of the money borrowed from the other companies and investing in risk free assets is termed as "Risk Free Borrowing. If he want to borrow money, he need to pay a interest on the borrowed money. f the rate of interest that the investor should pay for the borrowed money is known and can able to determine the money that has to be returned at the time of repayment then, that is referred to as risk free borrowing. Risk free borrowing is characterized by certainty regarding the repayment of loan.

In risk free borrowing, the investor assumes that the rate of interest that he has to pay for the borrowed money will be equal to the rate of return he can earn on the investment in risk free assets

Example

If the investor invested the money in risk free asset at a rate of return of 5% then the interest rate for the money borrowed will be equal to 5% only

The investment made needs to be equal to 1. If he invested an amount of 50,000/- in a company and borrowed 5,000/- then the total money he had is found to be 55,000 (50,000+5,000), then he has to mention the proportion of the borrowings as "negative values". So that it can be converted to positive value

The total proportion is equal to 1.1 (55000/50,000), thus we have to mention it as 1.1 + (- 0.1) = 1. Interpretation nvestors with higher levels of risk aversion will opt for less borrowings than the investors with less risk aversion

PROBLEM

1. **After a thorough analysis of both the aggregate stock market and the stock of XYZ company, you develop the following opinion,**

Likely Returns (%)			
Economic conditions	Aggregate market	X Y Z	Probability
Good	16	20	0.4
Fair	12	13	0.4
Poor	3	-5	0.2

At present the risk free rate is equal to 7%. Would all investment in XYZ be rise.

Solution :

Given that,

Aggregate stock market and stock of XYZ company

Risk-free rate = 7% i.e., 0.07

Aggregate Market		
Economic Conditions	Likely Returns	Probability
Good	16 (0.07) = ₹ 1.12	0.4
Fair	12 (0.07) = ₹ 0.84	0.4
Poor	3 (0.07) = ₹- 0.21	0.2

The expected return is,

= 0.4(1.12) + 0.4 (0.84) + 0.2 (0.21)

= 0.448 + 0.336 + 0.042

= ₹0.826

XYZ		
Economic Conditions	Likely Returns	Probability
Good	20(0.07) = ₹ 1.4	0.4
Fair	13(0.07) = ₹ 0.91	0.4
Poor	- 5 (0.07) = ₹ 0.35	0.2

The expected return is,

= 0.4(1.4) + 0.4 (0.91) + 0.2 (- 0.35)

= 0.56 + 0.364   0.07

= ₹ 0.854

Interpretation

As the investment in XYZ, stock market is greater than aggregate stock market. It is advisable that all investment in XYZ could be rise

4.4.3 Capital Market Line – Separation Theorem

Q11. Explain the concept of capital market line and separation theorem.

Answer :

Capital Market Line

If all the investors hold the same risky portfolio, then in equilibrium, it must be the market portfolio. In that sense R_f and R_m straight line is the Capital Market Line (CML). All investors choose along this line and efficient portfolios will be on this line. Those which are not efficient will however be below the line.

The equation of the capital market line connecting the riskless asset with a risky portfolio is,

$$R_e = R_i + \frac{R_m - R_f}{\sigma_m}\sigma_e$$

Subscript (e) denotes the efficient portfolio $\frac{R_m - R_f}{\sigma_m}$

can be though as the extra return that can be gained by increasing the amount of risk on an efficient portfolio by one unit.

Thus, $\frac{R_m - R_f}{\sigma_m} \times \sigma_e$ can be taken to represent the market price of risk times the amount of risk in the portfolio R_f is the risk free return for abstaining consumption for period one. Thus, R_f is the price of them. σ_e is risk on the portfolio

Separation Theorem

The linear efficient set is same for all investors because it involves combinations of agreed upon tangency portfolio due to the complete agreement among investors on the estimates of securities expected returns, variances and covariances, as well as on the size of the risk-free rate However, all investors choose different portfolios because they have different preferences towards risk and return. It must be noted that although the chosen portfolios will be different but each investor will choose the same combination of risky securities. This means that each investor will spread his or her funds among risky securities in the same relative proportions, adding risk-free borrowing or lending in order to achieve a personally preferred overall combination of risk and return. This feature is often referred to as separation theorem.

In a nutshell, the optimal combination of risky assets for an investor can be determined without any knowledge of the investor's preferences towards risk and return.

4.5 CAPITAL ASSET PRICING MODEL (CAPM)

Q12. What is CAPM? Discuss its assumptions.

OR

Explain the Capital Asset Pricing Model (CAPM).

(Refer Only Topic: Capital Asset Pricing Model (CAPM))

Answer :　　　　　　　　　　　　May/June-12, Q5(a)

Capital Asset Pricing Model (CAPM)

An equilibrium model of asset pricing that states that the expected return on a security is a positive linear function of the security's sensitivity to changes in the market portfolios return. The relevant risk for an individual asset is systematic risk (or market related risk) because non-market risk can be eliminated by diversification and systematic risk is measured by beta. In other words, all securities are expected to yield returns commensurate with their riskiness. Therefore, the relationship between an assets return and its systematic risk can be expressed by the CAPM, which is also called the security market line. The equation is as follows,

$$\bar{r_i} = r_f + \beta_i\,[\bar{r_m} - r_f]$$

Where, $\bar{r_i}$ = The expected return for an asset

r_f = The risk-free rate

r_m = The expected market return (usually assumed to be BSE sensex)

β_i = The assets beta

The CAPM is an equilibrium model for measuring the risk-return trade-off for all assets including both inefficient and efficient portfolios. A graph of the CAPM is as follows,
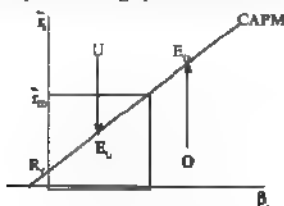

Figure: Capital Asset Pricing Model

The above figure depicts two assets U and O, that are not in the equilibrium on the CAPM. Asset U is undervalued and therefore, a very desirable asset to own. U's price will rise in the market as more investors purchase. However, as U's price goes up, it return falls. When U's return falls to the return consistent with its beta on the SML, equilibrium is attained. With O, just the opposite takes place. Investors will attempt to sell O, since it is over valued, and therefore, put downward pressure on O's price. When the return on asset O increases to the rate that is consistent with the beta risk level given by the SML, equilibrium will be achieved and downward price pressure will cease.

Assumptions of CAPM

Some of the assumptions behind the CAPM are as follows,

1. Investors evaluate portfolios by looking at the expected returns and standard deviations of the portfolios over a one-period horizon.

2. Investors are never satisfied, so when given a choice between two otherwise identical portfolios, they will choose the one with the higher expected return.

3. Investors are risk-averse, so when given a choice between two otherwise identical portfolios, they will choose the one with the lower standard deviation.

4. Individual assets are infinitely divisible, meaning that an investor can buy a fraction of a share if he or she so desires.

5. There is a risk free rate at which an investor may either lend (that is, invest) money or borrow money.

6. Taxes and transaction costs are irrelevant.

7. All investors have the same one-period horizon.

8. The risk free rate is the same for all investors.

9. Information is freely and instantly available to all investors.

10. Investors have homogeneous expectations, meaning that they have the same perceptions in regard to the expected returns, standard deviations and covariances of securities.

Q13. **Mention the assumptions underlying the standard Capital Asset Pricing Model (CAPM). Despite its limitations, why is the CAPM widely used?**

OR

Discuss the assumptions and applicability of Capital Asset Pricing Model (CAPM) under present situation. *April/May-14, Q5(a)*

(Refer Only Topics: Assumptions of CAPM, Advantages/Applicability of CAPM)

OR

Explain the assumptions and applicability of capital asset pricing model

(Refer Only Topics: Assumptions of CAPM, Advantages/Applicability of CAPM)

Answer : *Dec.-13, Q5(a)*

Assumptions of CAPM

For answer refer Unit-IV, Page No. 4.21, Q.No. 12, Topic Assumptions of CAPM.

Limitations of CAPM

The CAPM which is used to obtain the cost of capital or discount rate essential for appraising the investment projects include certain limitations,

1. Basically, CAPM is a single period model, due to which the discount rates which were calculated with the help of CAPM may not be appropriate.

2. The unsystematic risk gets diversified because CAPM assumes only systematic risk

3. The risk can be summarized in single figure (beta) is one of the assumptions of CAPM.

4. CAPM assumes close similarities of activities and business risk which may arise difficulties in comparing the proxy entity

Advantages/Applicability of CAPM

Capital Assets Pricing Model (CAPM) is widely used for evaluating investment projects because of its significant role,

1. CAPM is advantageous in evaluating the portfolio performance and cost of equity of the companies.

2. It assesses the risk and helps in determining the relationship between the risk and expected return of the portfolio

3. CAPM is future oriented model i.e., it helps in predicting the future returns of securities.

4. It is also used even if the dividend information is not provided.

5. CAPM uses historical data for calculating the betas which may or may not predict the risk associated with the future returns.

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PROBLEMS

1. From the following Information, compute expected return based on CAPM and APT models.

    (i) Return on market portfolio is 15%, equity beta is 1.2 and risk-free return is 15%.

Factors	Market Price of Risk	Sensitivity Indices
Inflation	6%	1.1
Industrial production	2%	0.8
Risk premium	3%	1.0
Unanticipated changes	4%	-0.9

Solution :

According to CAPM model,

$$r_p = r_f + \beta_i (r_m - r_f)$$
$$= 0.15 + 1.2 (0.15 - 0.15)$$
$$= 0.15 + 0$$
$$= 0.15 \text{ or } 15\%$$

According to APT model,

$$r = \lambda_0 + [\lambda_1 \beta_i + \lambda_2 \beta_{i2} + \lambda_3 \beta_{i3} + \lambda_4 \beta_{i4}] (r_m - r_f)]$$
$$r = 0.15 + [(0.06 \times 1.1) + (0.02 \times 0.8) + (0.03 \times 1.0) + (0.04 \times -0.9)] (0.15 - 0.15)$$
$$= 0.15 + (0.066 + 0.016 + 0.03 - 0.036) (0)$$
$$= 0.15 + 0 = 0.15$$

The rates of return are same for both CAPM and APT models. Therefore, it can be concluded that interest rate has a positive effect on the return.

2. Consider two stocks, P and Q.

	Expected Return (%)	Standard Deviation (%)
Stock-P	16	25
Stock-Q	18	30

The returns on the two stocks are perfectly negatively correlated. What is the expected return of a portfolio constructed to drive the standard deviation of portfolio return to zero?

Solution :

When the returns on two stocks are perfectly negatively correlated, then the weights that drive the standard deviation of portfolio return to zero can be calculated as follows,

$$W_P = \frac{\sigma_Q}{\sigma_P + \sigma_Q}$$

$$\sigma_Q = 30$$
$$\sigma_P = 25$$

$$W_P = \frac{30}{25 + 30}$$

$$= 0.545$$

Calculation of expected return of portfolio,

$$E(r_p) = (0.545 \times 16\%) + (0.455 \times 18\%)$$
$$= 8.72 + 8.19$$
$$= 16.91\%$$

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4.5.1 Security Market Line, Identifying Over-priced and Under-priced Securities

Q14. Discuss briefly Security Market Line (SML).

Answer :

In case of portfolios involving complete diversification. Where the unsystematic risk tends to zero, there is on y systematic risk measured by beta(β) the only dimension of a security, which concerns us are expected return and beta. We have seen earlier that all portfolios of investments lie along a straight line i the return to beta space
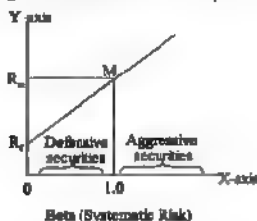

Figure: Security Market Line

To determine this line we need to connect the intercept (where beta is zero as it is riskless security) and the market portfolio (beta of one and return of R_m). These points are R_f and M is the graph above. The equation of that straight line is Security Market Line (SML)

$$R_i = \alpha + b\,\beta$$

$R_f = \alpha$ as $b\,\beta$ becomes zero for riskless asset ($\beta = 0$)

Where,

$\beta = 1$

$R_m = \alpha + b(1)$ or $R_m \quad \alpha = b$

Since,

$R_f = \alpha$, then $R_m \quad R_f = b$

Combining the above two results, we have,

$$R_i = R_f + \beta_i (R_m \quad R_f)$$

This is the key equation for security market line and can be rewritten as,

$$R_i \quad R_f = \beta_i (R_m \quad R_f)$$

Covariance to have as much as possible negative interactive effect among the securities within the portfolio and coefficient of correlation to have – 1 (negative). So that the overall risk of the portfolio as a whole is nill or negligible. Then the securities have to be combined in a manner that standard deviation is zero.

Q15. How to identify over-priced and under-priced securities?

Answer :

The security market line provides the linear relationship between the expected return and the standard deviation of the given market portfolio. The Security Market Line (SML) can be determined by using the equation

$$R_i - R_f = \beta_i (R_m - R_f)$$
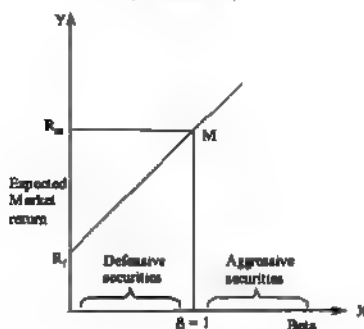
Figure

Through the security market line, investors can evaluate the performance of the investment proposals by establishing the benchmarks. SML gives the desired returns to the investors with risk and also the time value of money

Simply, security market line is a graphical representation showing the relationship between systematic risk involved in investment and the expected returns.

SML provides a benchmark to identify whether the securities are fairly priced or not. The securities that are plotted on the SML are said to be fairly priced whereas the remaining securities which are deviated from the SML are either considered to be underpriced or overpriced.

Overpriced securities are those whose expected return is less than its equilibrium return these securities have negative value of alpha (α)

Underpriced securities are those whose expected return is more than its equilibrium return. They have a positive value for alpha (+α).

Underpriced securities yield more returns than expected and are plotted above the security market line. Whereas, overpriced securities yield less returns than expected and are plotted below the SML.

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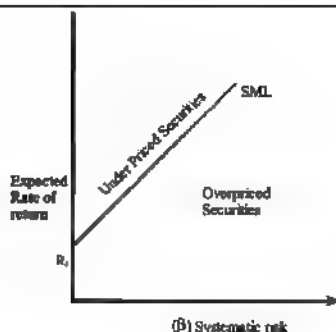
Figure

Underwriters sell those securities at a price higher than the fixed rate which leads to decrease in demand for that securities i.e., investor do not invest their money in securities. Because of overpricing, the company issuing securities will suffer losses.

Underpricing the securities by the underwriters leads to the increase in demand for those securities which results in profits for the company. But actually these profits are at the expense of the companies as they were offering the securities at a price less than that of the fixed rate. Though it yields more returns it involve some risk.

4.6 EFFICIENT FRONTIER

Q16.   What is an efficient frontier? How does it establish an optimum portfolio?

Answer :   *Dec.-14, Q5(a)*

Efficient Frontier

If we consider the infinite number of portfolios that could be formed from two or more securities and plotted these portfolio's expected return and risk, we would create the graph represented as follows. The efficient frontier is represented by the heavy dark line from E to F given in the figure below. Portfolios along curve EF dominate all other investment possibilities. Portfolio F, is the highest return portfolio, is the only one that is like a one-asset portfolio. The curvature of the efficient frontier depends upon the correlation of the asset's returns. The efficient frontier curve is convex towards the r axis because all assets have correlation coefficients that are less than positive unity and greater than the negative unity.

Figure (1): Efficient Frontier

Under the assumptions of Markowitz theory, an investor will want to hold a portfolio somewhere along the efficient frontier that is along EF. The exact location depends on the investor's risk-return preferences. A set of indifference curves for each investor will show his or her risk-return trade off. Those investors with more risk-aversion require more compensation for assuming risk and will choose a portfolio along the lower end of the efficient frontier close to E. The portfolio chosen will be optimal because no other portfolio along the efficient frontier can dominate another in terms of risk and return.

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Borrowing and Lending Portfolios

By the definition of an economic equilibrium in a market, supply and demand are equal for all goods. So for capital market to be at equilibrium, every security in the market must be held by some owner. Since all investors unanimously want "m", which means that, in equilibrium, "m" must be a huge portfolio containing all securities in the proportions x_i.

Where,

$$x_i = \frac{\text{Total value of the } i^{th} \text{ firms securities}}{\text{Total value of all the securities in the market}}$$

Now, let "m" be designated as the market portfolio, the unanimously desirable portfolio containing all securities is exactly the proportion in which they are supplied. The return on the market portfolio is the weighted average return on all securities in the market. In equilibrium "R" must be the interest rate that equates the supply of and demand for loanable funds.

In reality there is no market portfolio. However it is a useful theoretical construct, since the return on "m" is the return on BSE sensex, Dow Jones average and others are estimating the return on "m" would be the optimum market index. The portfolio "m" on CML is the only portfolio that is not utilizing the opportunity to borrow or lend at the riskless rate R (i.e, $x_R = 0$ for m) as given in the figure (2).

The portfolios along the CML between R and m are lending portfolios. They all have some money invested in the riskless asset R, that is they are lending money at the rate R. Symbolically, $x_R > 0$ for lending portfolios. The portfolios above "m" on the CML are all leveraged or borrowing portfolios. They were constructed by borrowing at the rate R and investing the proceeds in "m", increasing the portfolios expected return. Borrowing portfolios on the CML have $x_R < 0$. When the borrowing and lending opportunities (at the riskless rate R) are considered, the true efficient frontier is the straight line called CML. These investment opportunities dominate the portfolios lying on the curve EF. "m" is the optimal portfolio of risky investment.
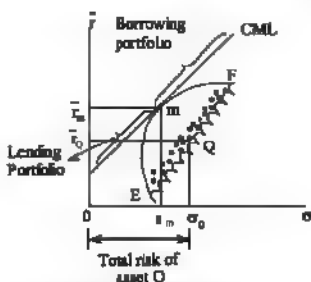
Figure (2): Borrowing and Lending Portfolios

So, when assets forms a linear opportunity locus in risk-return space, they are perfectly correlated. This means that the returns from portfolios on CML must all vary together systematically. These portfolios along the CML have their unsystematic risk reduced to zero by diversification. Only the undiversifiable risk remains.

Thus, the investor can use borrowing or lending to attain the desired level of risk. Those investors with a high risk aversion will prefer to lend and thus hold a combination of risky assets and the risk free asset. Others with less risk aversion will borrow and invest more in the risky portfolios.

4.7 ARBITRAGE PRICING THEORY (APT): THE LAW OF ONE PRICE, TWO FACTOR ARBITRAGE PRICING

Q17. What is Arbitrage Pricing Theory (APT)? Explain the law of one price and two factor arbitrage pricing.

Answer :

Arbitrage Pricing Theory (APT)

An alternative model of asset pricing was developed by Stephen Ross and is known as Arbitrage Pricing Theory(APT). According to the theory, the returns of the securities are influenced by a number of macro economic factors such as growth rate of industrial production, rate of inflation, spread between long term and short term interest rates and spread between low grade and high grade bonds.

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Law of One Price

The foundation for APT is the law of one price. The law of one price states that two identical goods should sell at the same price. If they sold at differing prices any one could engage in arbitrage by simultaneously buying at the low price and selling at the high price and make a riskless profit.

Arbitrage also applies to financial assets. If two financial assets have the same risk, they should have the same expected return. If they do not have the same expected return, a riskless profit could be earned by simultaneously issuing (or selling short) at the low return and buying the high-return asset. Arbitrage causes prices to be revised as suggested by the law of one price

Arbitrage Pricing for One Risk Factor

The one factor model is equivalent to the Capital Asset Pricing Model (CAPM), λ_0 is equal to the risk-free rate (R_f). However, the assumptions of the two models differ. Both models assume investors (1) prefer more wealth to less (2) are risk-averse (3) have homogeneous expectations and (4) that capital markets are perfect. However, the APT, unlike the CAPM, does not assume (1) a one-period horizon (2) returns are normally distributed (3) a particular type of utility function (4) a market portfolio, or (5) that the investor can borrow or lend at the risk free rate. The one assumption unique to the APT is that unrestricted short selling exists. The utopian situation is available to only a few (such as investment bankers and stock exchange specialists) in today's financial markets.

The arbitrage pricing line for one risk factor can be written as,

$$\hat{r}_i = \lambda_0 + \lambda_1 \beta_i$$

Where,

$\bar{r}$ = The expected return on security i

λ_0 = The return for a zero beta portfolio

β_i = The sensitivity of the ith asset to the risk factor

λ_1 = The factors risk premium.

Two Factor Arbitrage Pricing

The two-factor model describes the returns of ith security as follows,

$$\bar{r} = \lambda_0 + \lambda_1 \beta_{i1} + \lambda_2 \beta_{i2}$$

Where, λ_2 is the risk premium associated with risk factor 2 and β_{i2} is the factor beta coefficient for factor 2 and factors 1 and 2 are uncorrelated

PROBLEMS

1. **Determine the required (or equilibrium) return for the following three securities.**

Security	β_{i1}	β_{i2}
A	1.20	1.00
B	-0.50	0.75
C	0.75	1.30

Assume the following two-factor model applies.

$$\bar{r}_i = 4\% + 3\% \, \beta_{i1} + 5\% \, \beta_{i2}$$

Solution :

Determination of required return using two-factor model is.

$r_A = 4\% + 3\% (1.2) + 5\% (1) = 12.6\%$

$\bar{r}_B = 4\% + 3\% (-0.5) + 5\% (0.75) = 6.25\%$

$r_C = 4\% + 3\% (0.75) + 5\% (1.30) = 12.75\%$

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2. Determine the present value of the following cashflow.

Year	1	2	3	4	5
Cash flows (₹)	100	300	400	-500	700

Assume the following two-factor model of APT applies.

$\bar{r}_i = 3\% + 2\% \beta_{i1} + 5\% \beta_{i2}$

The relevant factor betas are,

$\beta_{i1} = -0.75$

$\beta_{i2} = 1.50$,

Solution:

According to two factor model of ATP, the required return is,

$\bar{r}_p = 3\% + 2\% (-0.75) + 5\% (1.5) = 9\%$

∴ Calculation of PV of cash flows is,

Year	CFS (₹)	PVIF @ 9%	PVs (₹)
1	100	0.9174	91.74
2	300	0.8417	252.51
3	400	0.7722	308.88
4	500	0.7084	354.20
5	700	0.6499	454.93
			PVCF 753.86

4.7.1 Equilibrium Risk-Return Relations

Q18. Explain the concept of equilibrium risk return relations.

Answer:

The risk return relationship propounded by the ATP can be represented as follows,

$$\bar{r}_p = r_f + \beta_{i1}(\bar{r} - r_f) + \beta_{i2}(\bar{r}_2 - r_f) + \dots + \beta_{ij}(\bar{r}_j - r_f) + \beta_{ik}(\bar{r}_k - r_f) \quad \dots (1)$$

Where,

$\bar{r}_i$ = Expected return on the ith asset

β_{ik} = Factor loading of the kth risk factor with respect to asset i

r_f = Risk free rate

$(r_k - r_f)$ = Risk premium associated with the jth risk factor

The risk premium is also represented by the symbol λ and hence equation (1) can be expressed as,

$$\bar{r}_p = \lambda_0 + \beta_i \lambda_1 + \beta_{i2} \lambda_2 + \dots + \beta_{ij} \lambda_j + \beta_{ik} \lambda_k$$

Where,

$\lambda_0 = r_f$ and λ_j represents the premium of the jth risk factor.

If we assume that there is only one risk factor which impacts security returns and this risk factor is the market portfolio, we can obtain the zero beta SML equation as follows,

$$r = r_f + \beta_i (r_i - r_f)$$

Where,

β_i = Return loading associated with risk factor which is the market portfolio

r_f = Return on a zero-beta portfolio

$(r_i - r_f)$ = Risk premium associated with market portfolio

Thus, we find the CAPM to be a special case of the APT

4.8 A SYNTHESIS OF CAPM AND APT

Q19. What are the similarities and differences between CAPM and APT?   Aug./Sept.-04, Q4(a)

OR

Compare and contrast capital asset pricing model and arbitrage pricing theory.

Answer :   April-17, Q5(a)

Like the Capital Assets Pricing Model (CAPM), Arbitrage Pricing Theory (APT) is an equilibrium model of asset pricing but assumes that the returns are generated by a factor model. Its assumption via-a-vis those of CAPM are set out first.

	APT		CAPM
1.	Investors do not look at expected returns and standard deviations. Based on the aw of one price, if the price of an asset is different in different markets, arbitrage brings them to the same price	1	Investors look at the expected returns and accompanying measured by standard deviations.
2.	Investors prefer higher wealth/risk-return analysis.	2	Investors are risk averse and returns to lower wealth.
3.	APT is based on the return generated by factor models.	3	Investors maximise wealth for a given level of risk

It is convenient to break up the expected return into two parts,

(i)   Risk free rate of return and

(ii)   The rest in the following equation, r_i is the risk free return and r_1 is the expected premium return per unit of sensitivity to the factor for portfolio.

$$rp = r_i + \lambda_1$$

Similarly, the expected return on pure factor 2 portfol.o,

$$rp_2 = r_i + \lambda_2$$

Thus, the investor by splitting his funds among risk free portfolios and pure factor portfolios, it is possible for him to form a portfolio with almost any sensitivity to each factor. Although theory claims that the non-factor risk can be reduced though theory claims that the non-factor risk can be reduced to zero, it is not possible in real life. Therefore, in practical investment or in portfolio operations, it is better to combine the capital asset pricing operations, it is better to combine the capital asset pricing theory and the APT model. Most investors prefer, no doubt higher levels of expected return and dislike higher levels of risk. The fact is that there is a trade off between them, which is not considered by the APT model. Synthesis of CAPM and APT is therefore more realistic

Beta coefficients can be used to reflect the risk factors and factor sensitivities can also be taken into account to arrive at the expected returns. Thus, if the returns are generated by two factors model, the beta coefficient of a security will be related to its sensitiveness to the factor and factor. Betas can be taken to reflect the different sens tivities of different factors

Beta coefficient for a security could be obtained by dividing $cov(r_i, r_m)$ by the variance of the market portfolio (σ_M^2)

Thus, $\beta_i = \dfrac{cov(r_i, r_m)}{\sigma_M^2}$

Security betas can appear in factor betas, if we ignore $\dfrac{cov(r_i, r_m)}{\sigma_M^2}$ then the equation is given below,

$$\beta_i = \left[\frac{cov(F_1, r_m)'}{\sigma_M^2} \times \beta_{i1}\right] + \left[\frac{cov(F_2, r_m)^2}{\sigma_M^2} \times \beta_{i2}\right] + \frac{cov(F_3, r_m)}{\sigma_M^2}$$

If the last term becomes zero, as referred to above, then,

$$\beta F_1 = \frac{cov(F_1, r_m)}{\sigma_M^2}$$

$$\beta F_2 = \frac{cov(F_2, r_m)}{\sigma_M^2}$$

It will be seen that βF_1 and βF_2 are constants as they do not vary from one security to another, the beta coefficient of a security is a function of its sensitiveness to the pervasive factors. Thus, by taking betas of securities, the question of sensitivity of security return to a factor is taken care of

Q20. Distinguish between CAPM and arbitrage pricing theory and state its validity in the stock market.

Answer : *April-15, Q5(a)*

Differences of CAPM and APT

For answer refer Unit-IV, Page No. 4.28, Q.No 19 (Table Only).

Validity of CAPM

The validity of CAPM in stock market can be evaluated from the following points,

1 CAPM focuses on market risk and enables investors to think about the level of risk involved in an asset.

2. It assists investor by providing basic concepts of risk which possess fundamental value

3 CAPM is more effective while selecting the portfolios and securities.

4 CAPM provides information related to the higher return and ower return securities. Based on such information, an investor may buy or sell securities.

5 Under CAPM, one of the major assumptions is that the investors take into account only market risk.

6 Investors can determine the expected return of a security with the help of given estimates of risk free rate, beta values and required rate of return of market. Once the expected return is calculated, it is helpful in determining or estimating the cost of retained earnings.

Validity of APT

The validity of Arbitrage Price Theory has been tested through various researches. According to empirical research, validity of APT can be divided into four activities. They are as follows,

1 In the beginning, empirical test would be conducted for APT to evaluate its validity

2 Next, the theory would focus on the estimation of numbers and pricing of factors.

3 In this, theory will be involved in identifying the economic factors which can determine returns.

4. Finally, validity of model is evaluated to describe some anomalies of CAPM.

PROBLEMS

1. Observe the following three portfolios for which the one factor arbitrage pricing theory is applicable.

Portfolio	X	Y	Z
Expected return	14%	11%	15%
Beta	0.8	0.5	0.7

You are required to,

(i) Find the values of λ_0 and λ_1, that are consistent with portfolios X and Y.

(ii) Find the equilibrium return for portfolio Z, using λ_0 and λ_1 found above.

(iii) Find the percentage of funds that should be invested in X and Y, to earn and arbitrage profit.

(iv) Find the amount or arbitrage profit that could be earned by selling short the portfolio made with X and Y for ₹ 1000 and purchasing portfolio Z.

Solution : *June-07, Q4(b)*

The general form of one factor APT

(i) Equilibrium equation is, $r_p = \lambda_0 + \lambda_1 \beta_p$

Substituting the values from equilibrium portfolio X and Y gives,

$$14 = \lambda_0 + \lambda_1 (0.8) \rightarrow \text{Portfolio } X$$
$$11 = \lambda_0 + \lambda_1 (0.5) \rightarrow \text{Portfolio } Y$$

Solving the above equations, we get,

$$\lambda_1 = 10\% \text{ and } \lambda_0 = 6\%$$

Therefore, the equilibrium APT equation that encompasses both X and Y is,

$$\boxed{r_p = 6\% + \beta_p (10\%)}$$

(ii) We want to create a new portfolio called 'A' with the beta of 0.7 (assume as Z). A will be composed portfolios of X and Y shares. This is determined as follows,

$$\beta_z = W_x \beta_x + W_y \beta_y$$
$$0.7 = W_x (0.8) + (1 - W_x) (0.5)$$
$$0.7 = 0.8 W_x + 0.5 \quad 0.5 W_x$$
$$0.2 = 0.3 W_x$$
$$W_x = \frac{0.2}{0.3}$$

$$\boxed{W_x = 0.66 \text{ (or) } 66\%}$$

Therefore, the weight of Y is (1   0.66)

$$\boxed{W_y = 0.34 \text{ (or) } 34\%}$$

(iii) Now the portfolio A that is composed of 66% Investment in X and 34% in Y has a beta of 0 7 same as that of portfolio Z. The expected return of A is,

$$r_A = 0.66 \, (r_X) + 0.34 \, (r_Y)$$

$$= 0.66 \, (14) + 0.34 \, (11) = 9 \ 24 + 3 \ 74$$

$$\boxed{r_A = 12 \ 98 \ \%}$$

(iv) If we sell portfolio 'A' (short) to raise cash of ₹ 000 to purchase portfolio 'Z' then arbitrage profit is as follows,

Portfolio	Initial Cash Flow	Expected Return ($\bar{r}$)	Ending Cash Flows	Portfolio Beta
A (Short)	–₹ 1000	12.98%	1000 × 12.98% = 129 8	0.7
Z(Long)	₹ 1000	15%	1000 × 15% = 150	+0 7
		0	+ ₹ 20.2	0

Therefore, the investor that recognizes this situation will make a risk less profit of ₹ 20 2 with zero commitment of funds.

2. **Calculate the Beta of securities P and Q from the following information (returns as percentages),**

Year	Return on S and P 500	Return on P	Return on Q
1	25	30	35
2	10	32	30
3	11	10	20
4	8	6	15
5	5	8	20

Solution :   *June/July-05, Q4(b)*

Year	Return on S and P 500	Return on P	Return on Q
1	25	30	35
2	10	32	30
3	11	10	20
4	8	6	15
5	5	8	20

Formula $\beta = \dfrac{\left[N \sum_i r_i r_m \right] - \left[\left(\sum_i r_m \right) \left(\sum_i r_i \right) \right]}{\left[N \sum_i r_m^2 \right] - \left[\sum_i r_m \right]^2}$

Where, r_i = Return on P

r_m = Return of the market index

N = Number of years.

Determination of Beta (β) for Security P

Year	r_j	r_m	r_m^2	$r_j r_m$
1	30	25	625	750
2	32	10	100	320
3	10	11	121	110
4	6	8	64	48
5	8	5	25	40
	$\Sigma r_j = 86$	$\Sigma r_m = 59$	$\Sigma r_m^2 = 935$	$\Sigma r_j r_m = 1,268$

$$\beta_r = \frac{\left[N\Sigma r_j r_m\right] - \left[\left(\Sigma r_m\right)\left(\Sigma r_j\right)\right]}{\left[N\Sigma r_m^2\right] - \left[\Sigma r_m\right]^2} = \frac{\left[(5)(1,268)\right] - \left[59 \times 86\right]}{\left[(5)(935)\right] - \left[(59)^2\right]}$$

$$= \frac{6340 - 5074}{4675 - 3481} = \frac{1266}{1194}$$

$\beta_r = 1.06$

The beta value for security P is, 1 06

Determination of Beta (β) for Security Q

Year	r_j	r_m	r_m^2	$r_j r_m$
1	35	25	625	875
2	30	10	100	300
3	20	11	121	220
4	15	8	64	120
5	20	5	25	100
	$\Sigma r_j = 120$	$\Sigma r_m = 59$	$\Sigma r_m^2 = 935$	$\Sigma r_j r_m = 1,615$

$$\beta_Q = \frac{\left[N\Sigma r_j r_m\right] - \left[\left(\Sigma r_m\right)\left(\Sigma r_j\right)\right]}{\left[N\Sigma r_m^2\right] - \left[\Sigma r_m\right]^2}$$

$$= \frac{\left[(5)(1,615)\right] - \left[59 \times 120\right]}{\left[(5)(935)\right] - \left[(59)^2\right]}$$

$$= \frac{(8,075) - (7,080)}{4675 - 3481}$$

$$= \frac{995}{1194} = 0.83$$

The beta value for security $Q = 0.83$

3.   Stock X and Y had the following returns over the past 5 years.

Year	2009	2010	2011	2012	2013
Return on X (%)	9	−10	15	17	21
Return on Y (%)	11	−13	19	21	15

Is it advisable to have a combination of both the stock in a portfolio?

Solution :   *(Model Paper-III, Q9(b) | April-15, Q5(b))*

Year	r_x	$(r_x-\bar{r}_x)$	$(r_x-\bar{r}_x)^2$	r_y	$(r_y-\bar{r}_y)$	$(r_y-\bar{r}_y)^2$	$(r_x-r_x)(r_y-\bar{r}_y)$
2009	9	−1.4	1.96	11	0.4	0.16	−0.56
2010	10	20.4	416.16	13	23.6	556.96	481.44
2011	15	4.6	21.16	19	8.4	70.56	38.64
2012	17	6.6	43.56	21	10.4	108.16	68.64
2013	21	10.6	112.36	15	4.4	19.36	46.64
	52		595.2	53		755.2	634.8

$$\bar{r}_x = \frac{52}{5} = 10.4$$

$$\sigma_x = \sqrt{\frac{595.2}{5}} = \sqrt{119.04} = 10.91$$

$$\bar{r}_y = \frac{53}{5} = 10.6$$

$$\sigma_y = \sqrt{\frac{755.2}{5}} = \sqrt{151.04} = 12.29$$

$$Cov(r_x, r_y) = \frac{\Sigma[(r_x - r_x)(r_y - r_y)]}{n} = \frac{634.8}{5} = 126.96$$

Coefficient of Correlation

$$\rho_{x,M} = \frac{Cov(r_x, r_y)}{\sigma_x \sigma_y} = \frac{126.96}{10.91 \times 12.29} = \frac{126.96}{134.08}$$

$$= 0.946$$

Hence, it is advisable to have a combination of both the stock in a portfolio as covariance between stock r_x and r_y is 126.96 which is positive number and indicates that both move in same direction. The correlation coefficient of both the stocks is 0.946. As it is a positive number, they are positively related and indicates that strength of the correlation is strong.

4.   The expected returns and betas are given below for three stocks.

Stock	Expected Return	Expected Beta
Hero	16%	1.25
Icon	18%	0.95
Jack	24%	1.40

Assume risk-free return as 9% and market return as 15%. Determine which stocks are undervalued? Overvalued?

Solution :   *Dec.-14, Q5(b)*

Determination of return for each stock, that is consistent with equilibrium using the CAPM is,

$$r_p = r_f + \beta_i(\bar{r}_m - r_f)$$

(i) **Hero**

$$r_H = 9 + 1.25 (15 - 9)$$
$$= 9 + 1.25 (6)$$
$$= 9 + 7.5$$
$$= 16.5$$

Stock Hero is overvalued as its expected return (16%) is less than its equilibrium return (16.5%)

(ii) **Icon**

$$\bar{r}_I = 9 + 0.95 (15 - 9)$$
$$= 9 + 0.95 (6)$$
$$= 9 + 5.7$$
$$= 14.7\%$$

∴ Stock Icon is undervalued as its expected return (18%) is more than equilibrium return (14.7%).

(iii) **Jack**

$$\bar{r}_J = 9 + 1.40 (15 - 9)$$
$$= 9 + 1.40 (6)$$
$$= 9 + 8.4$$
$$= 17.4\%$$

Stock Jack is undervalued as its expected return (24%) is more than its equilibrium return (17.4%)

Q1.   Security Market Line   *(Model Paper-I, Q4 | April-17, Q1(g) | Dec.-15, Q1(g) | Dec.-14, Q1(h))*

OR

What is SML?

Answer :   *Dec.-13, Q1(h)*

In case of portfolios involving complete diversification. Where the unsystematic risk tends to zero, there is only systematic risk measured by beta(β) the only dimension of a security, which concerns us are expected return and beta. We have seen earlier that all portfolios of investments lie along a straight line r the return to beta space.
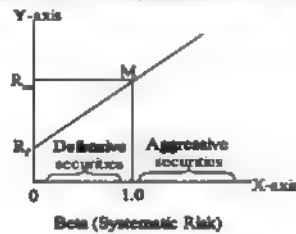
Figure: Security Market Line

Q2.   Arbitrage Pricing

Answer :   *April-17, Q1(h)*

Making use of the difference in the price of the same commodity (for instance, shares) traded in different markets to make profit, by buying in the lower market and selling in the higher market. It is non-speculative because an arbitrageur will only switch from one market to another, if the prices in both the markets are known and if the profit to be gained outweighs the cost of the operation. Simply, it is act of undertaking off setting simultaneous transactions in order to make profit.

Q3.   The Law of One Price

Answer :   *May/June-16, Q1(g)*

The foundation for APT is the law of one price. The law of one price states that two identical goods should sell at the same price. If they sold at differing prices any one could engage in arbitrage by simultaneously buying at the low price and selling at the high price and make a riskless profit.

Arbitrage also applies to financial assets. If two financial assets have the same risk, they should have the same expected return. If they do not have the same expected return, a riskless profit could be earned by simultaneously issuing (or selling short) at the low return and buying the high-return asset. Arbitrage causes prices to be revised as suggested by the law of one price.

Q4.   Efficient Frontier

Answer :   *(Dec.-15, Q1(h) | May/June-13, Q1(h))*

If we consider the infinite number of portfolios that could be formed from two or more securities and plotted these portfolio's expected return and risk, we would create the graph represented as follows. The efficient frontier is represented by the heavy dark line from E to F given in the figure below. Portfolios along curve EF dominate all other investment possibilities. Portfolio F, is the highest return portfolio, is the only one that is like a one-asset portfolio. The curvature of the efficient frontier depends upon the correlation of the asset's returns. The efficient frontier curve is convex towards the r axis because all assets have correlation coefficients that are less than positive unity and greater than the negative unity.
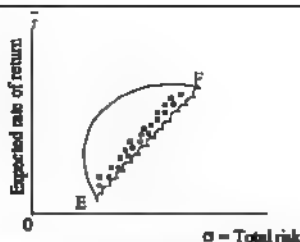
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Figure: Efficient Frontier

Q5. Capital Market Line Vs. Security Market Line

Points	Capital Market Line	Security Market Line
1. Concept	It is a set of portfolios obtainable by combining the market portfolio with risk free borrowing or lending. Assuming homogeneous expectations and perfect markets, the capital market line represents the efficient set. It gives the desirable set of investment opportunities between risk free and risky investments. Through capital market line, the rates of return could be determined which depends on two factors i.e., risk-free rates of returns and level of risk for a particular portfolio.	The security market line provides the linear relationship between the expected return and the standard deviation of the given market portfolio. The Security Market Line (SML) can be determined by using the equation. R_i $R_f = \beta_i (R_m$ $R_f)$ Through the security market line, the graphical representation existing between the risk and return of the market at a given time could be determined.
2. Uses of graph	Graph of CML shows efficient portfolios	On the other hand, graph of SML shows efficient as well as non-efficient portfolios.
3. Parameters of measuring risk	CML uses standard deviation and total risk factors to measure the risk	SML uses beta coefficient to measure the risk which may further help in determining the contribution of security risk towards the development of portfolio
4. Depictions	CML shows standard deviation of the portfolio on X-axis whereas the expected returns of portfolio is represented on Y-axis.	SML shows beta securities on X-axis whereas, on Y-axis it represents return on securities.

Q6. Minimum Variance Portfolio

OR

What is minimum variance portfolio?

The change in portfolio proportions of assets can change portfolio risk. By skillful balancing of the investment proportions in different securities, the portfolio risk can be brought down to zero. Such a portfolio is termed as minimum variance portfolio.

In a two asset portfolio composed of assets "a and b", the minimum risk portfolio requires an investment in asset "a" equal to X_a

Where, $X_a = \dfrac{\sigma_b^2 - \rho_{ab}\sigma_a\,\sigma_b}{\sigma_a^2 + \sigma_b^2 - 2\rho_{ab}\sigma_a\,\sigma_b}$

If the correlation coefficient is less than the ratio of smaller standard deviation to larger standard deviation, then the combination of two securities provides a lesser standard deviation of return than when either of the security is taken alone.

Q7. CML

OR

Capital Market Line

Answer :

If all the investors hold the same risky portfolio, then in equilibrium, it must be the market portfolio. In that sense R_f and R_m straight line is the Capital Market Line (CML). All investors choose along this line and efficient portfolios will be on this line. Those which are not efficient will however be below the line.

The equation of the capital market line connecting the riskless asset with a risky portfolio is

$$R_e = R + \frac{R_m - R_f}{\sigma_m} \sigma_e$$

Subscript (e) denotes the efficient portfolio. $\frac{R_m - R_f}{\sigma_m}$ can be though as the extra return that can be gained by increasing the amount of risk on an efficient portfolio by one unit.

Thus, $\frac{R_m - R_f}{\sigma_m} \times \sigma_e$ can be taken to represent the market price of risk times the amount of risk in the portfolio. R_f is the risk free return for abstaining consumption for period one. Thus, R_f is the price of them. σ_e is risk on the portfolio.

Q8. Markowitz Diversification

Answer :

Markowitz postulated that diversification should not only aim at reducing the risk of a security by reducing its variability or standard deviation, but by reducing the covariance or interactive risk of two or more securities in a portfolio.

As by combination of different securities, it is theoretically possible to have a range of risk varying from zero to infinity. Markowitz theory of portfolio diversification attaches importance to standard deviation to reduce it to zero, if possible.

Q9. How to determine portfolio return and risk?

Answer :

Portfolio Risk

Risk is defined as variability of return from a portfolio. The variability of return is measured with variance and standard deviation.

The variance of returns for a portfolio of assets can be calculated with the following general formula.

$$\sigma_p^2 = \sum_{i=1}^{n} \sigma_i W_i^2 + \sum_{i=1}^{n} \sum_{j=1}^{n} \sigma_{ij} W_i W_j$$

Where W_i and W_j are the weights for assets i and j, σ_{ii} is the variance for the ith asset, σ_{ij} is the covariance of assets i and j and n denote number of assets.

The square root of the variance is the portfolio's standard deviation of returns (σ_p)

The portfolio standard deviation of X and Y is,

$$= \sqrt{\sigma_X^2 W_X^2 + \sigma_Y^2 W_Y^2 + 2\rho_{XY} \sigma_X \sigma_Y W_X W_Y}$$

Portfolio Return

The return on a portfolio is simply the weighted average return, a portfolio return can be calculated with the following equation.

$$r_p = \sum_{i=1}^{n} W_i r_i$$

Where,

W_i is the weight of asset i and

r_i is the return for asset i

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Q10. State assumptions of CAPM.

Answer : *Dec.-12/Jan.-13, Q1(h)*

Some of the assumptions behind the CAPM are as follows,

1. Investors evaluate portfolios by looking at the expected returns and standard deviations of the portfolios over a one-period horizon.

2. Investors are never satisfied, so when given a choice between two otherwise identical portfolios, they will choose the one with the higher expected return.

3. Investors are risk-averse, so when given a choice between two otherwise identical portfolios, they will choose the one with the lower standard deviation.

4. Individual assets are infinitely divisible, meaning that an investor can buy a fraction of a share if he or she so desires.

5. There is a risk free rate at which an investor may either lend (that is, invest) money or borrow money.

EXERCISE PROBLEMS

1. Consider two asset portfolio A and B

    $\sigma_A = 14\%$

    $\sigma_B = 16\%$

    Correlation between A and B is +1, 0, –1.

    Determine minimum risk portfolio for A and B.

    (Ans: If $p_{AB} = +1$: $X_A = 8$, $X_B = 7\%$, If $p_{AB} = 0$: $X_A = 0.57$, $X_B = 0.43$, If $p_{AB} = -1$: $X_A = 0.53$, $X_B = 0.47$).

2. Assume that the risk-free rate is 10%, expected return on the market is 16% and the return on stock c is 18%.

    (a) Determine the implicit beta for stock c.

    (b) What is stock c's return if its beta is 0.75?

    (Ans: (a) $\beta_c = 1.33$, (b) $f_c = 14.5\%$).

3. The SAL and GAL corporation have the following risk and return status.

    $r_s = 15\%$, $r_G = 17\%$, $\sigma_s = 30\%$, $\sigma_G = 25\%$, $p_{sG} = 0.6$.

    Determine the minimum risk portfolio.

    (Ans: 67.74%).

4. The return of Flex stock is related to factors 1 and 2 as given below.

    $\bar{r}_j = \lambda_0 + 0.6\lambda_1 + 1.3\lambda_2$ is where 0.6 and 1 3 are sensitivity coefficients. λ_1 risk premium is 6% and λ_2 is 3% and risk-free return. $\lambda_0 = 7\%$. What is the stock's expected return?

    (Ans: 0.145 or 14.5%).

5. Unlimited profits Limited, is a financial consultancy managing a fund consisting of five stocks. The risk-free rate is 8% and the expected market return is 15% using the information in the following table.

    You are required to find the portfolio expected return.

Stock	Market value	Beta
Trash	₹ 1,65,000	0.68
Allen	₹ 3,80,000	1 41
Veecee	₹ 3,25,000	1.12
Kanchi	₹ 2,10,000	1 18
Chilka	₹ 5,00,000	1 26

    (Ans: 16.12%).

INTERNAL ASSESSMENT

I. Multiple Choice

1. The theory which provides conceptual framework to the portfolio management process is, [ ]
   - (a) Modern portfolio theory
   - (b) Arbitrage pricing theory
   - (c) Capital market theory
   - (d) None of the above

2. The excess return to beta ratio = [ ]
   - (a) $\dfrac{\beta_i}{r_i \quad r_f}$
   - (b) $\beta_i (r_i - r_f)$
   - (c) $\dfrac{r - r_f}{\beta_i}$
   - (d) $\beta_i + r_i - r_f$

3. The model which considers multifactor to measure performance of portfolio is known as, [ ]
   - (a) Single index model
   - (b) Multi index model
   - (c) Single factor portfolio
   - (d) Multiple factor portfolio

4. A portfolio against which the investment perfor-mance of an investor can be compared for the purpose of identifying investment skill is, [ ]
   - (a) Benchmark portfolio
   - (b) Arbitrage portfolio
   - (c) Optimal portfolio
   - (d) None of the above

5. Some of the assumptions of CAPM are, [ ]
   - (a) Investors are risk avers
   - (b) Investors never satisfie
   - (c) Investors have homogeneous expectation
   - (d) All the above

6. The line connecting the intercept and the market portfolio is, [ ]
   - (a) Capital market line
   - (b) Security market line
   - (c) Efficient frontier
   - (d) Portfolio line

7.   Which of them are not the assumptions of APT?   [   ]

    (a) A one- period horizon

    (b) Market portfolio

    (c) Both (a) and (b)

    (d) Risk averse

8.   An additional return obtained by a portfolio manger for his superior stock selection ability is,   [   ]

    (a) Net selectivity

    (b) Total selectivity

    (c) Marginal selectivity

    (d) None of the above

9.   In reward to variability, $S_p =$ [   ]

    (a) $\dfrac{\text{Risk premium}}{\text{Total risk}}$

    (b) Risk premium + Risk

    (c) Premium × Risk

    (d) $\dfrac{\text{Total risk}}{\text{principal}}$

10. A process of holding a well diversified protfolio for a long term with the buy and hold approach is,   [   ]

    (a) Active portfolio strategy

    (b) Passive portfolio strategy

    (c) Moderate portfolio strategy

    (d) Normal portfolio strategy

II. Fill in the Blanks

1.   ————— is a theoretical framework for analysis of risk and return and their relationships.

2.   A professional who manages investment portfolios with the objectives of profitability, growth and risk minimization is · —————.

3.   ————— states that two identical goods should be sold at the same price

4.   The linear relationship between the required rates of return for efficient portfolio and their standard deviations is represented by —————.

5.   Stephen Ross developed an alternative model of asset pricing is known as—————.

6.   The relationship between an assets return and its systematic risk is expressed by

7.   By skilful balancing of the investment proportions in different securies, the portfolio risk can be minimized to zero, this portfolio is termed as   ,

8.   ————— is a portfolio selection approach developed by William Sharpe.

9.   ————— is used to reflect the risk factors and factor sensitivities can also be taken into account to arrive at the expected returns.

10. An asset which have certain expected return and variance of return is zero is —————.

KEY

I.   Multiple Choice

1. (a)

2. (c)

3. (b)

4. (a)

5. (d)

6. (b)

7   (c)

8. (a)

9. (a)

10. (b)

II.   Fill in the Blanks

1.   Markowitz model

2.   Portfolio manager

3.   Law of one price

4.   Capital market line

5   Arbitrage pricing theory

6.   Capital asset pricing model

7.   Minimum variance portfolio

8.   Single index model

9.   Beta coefficients

10. Risk free asset

III.   Very Short Question and Answers

Q1.   What is Market Portfolio?

Answer :

A market portfolio consists of an investment in all securities. The proportion invested in each security equals the percentage of the total market capitalization represented by the security. They are also known as market index.

Q2.   What is meant by Multi Index Model?

Answer :

The model which considers multifactor to measure performance of portfolio is known as multi index model. APT multiple factor model is one such model which considers a number of variables into account for determining return from a portfolio.

Q3.   Write a short note on Single Index Model.

Answer :

A model that considers one factor to evaluate performance of a portfolio is known as single index model. Sharpe's index is one such model which considers only risk factor to measure portfolio performance. It established relationship between risk premium and total risk. It is based on assumption of CAPM that investors look at the expected returns and accompanying risk measured by standard deviation.

Q4.   Who is Portfolio Manager?

Answer :

A professional who manages investment portfolios with the objectives of profitability, growth and risk minimization. He is expected to manage the investor's assets prudently and chooses particular investment avenues, with a view to maximize profits.

Q5.   What is Benchmark Portfolio?

Answer :

A portfolio against which the investment performance of an investor can be compared for the purpose of determining investment skill. A benchmark portfolio represents a relevant and feasible alternative to the investor's actual portfolio and in particular is similar in terms of risk exposure.

UNIT

5

Portfolio Evaluation

After studying this unit, one would be able to understand,

❖ Various Performance Measures of Portfolio.

❖ Concept of Mutual Funds – Its Genesis and Features.

❖ Types and Schemes of Mutual Funds.

❖ Concept of NAVs, Costs, Loads and Return of Mutual Funds.

❖ Problems and Prospects Relating to Mutual Funds in India.

❖ Regulatory Framework for Mutual Fund in India.

❖ How Mutual Fund Investors get Protected in India.

INTRODUCTION

The performance of a portfolio is evaluated by taking into consideration both risk and return. Four popularly employed performance measures are Sharpe's measure, Treynor's measure, Jensen's measure and Fama's decomposition of returns.

Mutual fund is a collective investment. Till 1986, Unit Trust of India was the only available mutual fund company in India but later on both public and private sector banks engaged in mutual fund business.

In India, mutual fund industry have registered a healthy growth in comparison to banks and insurance companies is small. It is registered with SEBI and constituted as a trust under the India Trust Act, 1881. Mutual Funds are referred as "open-end investment companies" which are most popular type of managed company which sell shares to investors after the sale of shares started.

5.1   PERFORMANCE MEASURES – SHARPE'S REWARD TO VARIABILITY INDEX

Q1.   Explain the concept of performance of portfolio. Discuss sharpe's reward to variability index.

Answer :

Portfolio Performance Evaluation

Portfolio evaluation is the last step in the process of portfolio management. Portfolio analysis, selection and revision are undertaken with the objective of maximizing returns and minimizing risk. Portfolio evaluation is the stage, where we examine to what extent the objectives has been achieved. Through portfolio evaluation the investor tries to find out how well the portfolio has performed.

It is essentially the process of comparing the return earned on a portfolio with the return earned on one or more other portfolios or on a benchmark portfolio. Portfolio evaluation essentially comprises of two functions, performance measurement and performance evaluation. Performance measurement is an accounting function which measures the return earned on a portfolio during the holding period or investment period. Performance evaluation on the other hand, addresses such issues as whether the performance was superior or inferior, whether the performance was due to skill or luck etc., while evaluating the performance of a portfolio. the return earned on the portfolio has to be evaluated in the context of the risk associated with that portfolio.

Two methods of measuring the reward per unit of risk have been proposed by William Sharpe and Jack Treynor respectively in their pioneering work on evaluation of portfolio performance

Sharpe's Reward to Variability Index

The performance measure developed by William Sharpe is referred to as the sharpe ratio or the reward to variability ratio. It is the ratio of the reward or risk premium to the variability of return or risk as measured by the standard deviation of return. The formula for calculating sharpe ratio may be stated as,

$$S_p = \frac{\text{Risk premium}}{\text{Total risk}} = \frac{r_p - r_f}{\sigma_p}$$

Where,

$\bar{r}_p$ = The realized return on the portfolio

r_f = The risk-free rate of return

σ_p = The standard deviation of returns for portfolio.

Therefore, Sharpe assumes that the portfolio under consideration is the whole or substantially the whole of the investors total portfolio. This means that, if there any unsystematic risk still left in the portfolio and this cannot be eliminated.

PROBLEM

1.   **Assuming the risk free rate as 6% and given the following returns and risks, calculate the Sharpe's measure of portfolio performance.**

Portfolio return	Expected	σ_p	Beta
Chandu and Bros	14	3	0.4
Bomma and Bros	20	8	1
Vishal and Bros	26	8	1.1
Vibhav and Bros	30	13	1.2
Kalyan and Bros	36	15	1.4

Solution :   *Jan.-12, Q6(b)*

Sharpe's Performance Measure

R_r = Expected return

R_f = Risk free rate = 6 %

σ_i = Standard deviation

Portfolio Return	$R_T - R_F$	Sharpe Index $(R_T - R_F /\sigma_p)$	Sharpe's Rank
Chandu and Bros	14 6 = 8	$\frac{8}{3} = 2.67$	2
Bomma and Bros	20– 6 = 14	$\frac{14}{8} = 1.75$	5
Vishal and Bros	26– 6 = 20	$\frac{20}{6} = 3.33$	1
Vibhav and Bros	30– 6 = 24	$\frac{24}{13} = 1.85$	4
Kalyan and Bros	36– 6 = 30	$\frac{30}{15} = 2$	3

5.1.1 Treynor's Reward to Volatility Index

Q2. How Treynor's reward to volatility method is used in performance measurement? Compare and contrast reward to volatility and variability indexes.

Answer :

Treynor's Reward to Volatility Index

The performance measure developed by Jack Treynor is referred to as Treynor ratio or reward to volatility ratio. t is concerned with systematic risk (or beta) and therefore, it is the relationship between reward or risk premium to the volatility of return as measured by the portfolio beta. The formula for calculating Treynor index may be stated as follows,

$$T_p = \frac{\text{Risk premium}}{\text{Portfolio's } \beta} = \frac{\bar{r}_p - r_f}{\beta_p}$$

Where,

r_p = The realized return on the portfolio

r_f = The risk-free rate of return

β_p = The portfolio beta

Therefore, Treynor assumes that the portfolio under consideration is itself only a part of the investor's total portfolio. The investor can therefore, eliminate any unsystematic risk by ensuring that his total portfolio is well diversified.

Sharpe Index Vs Treynor Index

Both the ratios are relative measures of performance because they relate the return to the risk involved. However, they differ in the measure of risk used for the purpose. Sharpe uses the total risk as measured by standard deviation, while Treynor employs the systematic risk as measured by the beta coefficient.

In a fully diversified portfolio, all unsystematic risk would be diversified away and the relevant measure of risk would be the beta coefficient. For such a portfolio, Treynor ratio would be the appropriate measure of performance evaluation. For a portfolio that is not so well diversified, the Sharpe ratio using the total risk measure would be the appropriate performance measure.

PROBLEMS

1. From the following information pertaining to mutual funds of Krishna & Co. and Kiran & Co. and the market index portfolio, rank the performance of these from the measures of Treynor and sharpe's.

	Krishna & Co.	Kiran & Co.	Market
RP	16	12	15.7
SP	13	9	13.0
bP	0.83	0.66	1.0

Assume the risk free rate : 8%.

Solution :

Given that,

Risk free rate (r_f) = 8%

Sharpe's index $S_p = \dfrac{\overline{r_p} - r_f}{\sigma_p}$

Treynor's index $T_p = \dfrac{\overline{r_p} - r_f}{\beta_p}$

R_p = Expected return

β_p = Beta co-efficient

σ_p = Standard deviation.

Mutual fund	Sharpe measure $\dfrac{r_p - r_f}{\sigma_p} = S_p$	Sharpe rank	Treynor measure $T_p = \dfrac{r_p - r_f}{\beta_p}$	Treynor rank
Krishna & Co	$S_p = \dfrac{16-8}{13} = 0.615$	I	$\dfrac{16-8}{0.83} = 9.64$	I
Kiran & Co	$\dfrac{12-8}{9} = 0.444$	II	$\dfrac{12-8}{0.66} = 6.061$	II
Market Index	$\dfrac{15.7-8}{13} = 0.592$		$\dfrac{15.7-8}{1} = 7.7$	

Market Index

Market index = $\dfrac{r_m - r_f}{\beta_p}$ and $\dfrac{r_m - r_f}{\sigma_p}$

Treynor index   Sharpe's index

Conclusion

Both Treynor's and Sharpe's performance measure give same opinions that Krishna & Co. out performed the market whereas Kiran & Co's performance is less than the market rates.

2.   Six portfolios experienced the following results during a seven year period.

Portfolio	Average Annual Return (%)	Standard Deviation (%)	Correlation with Market
A	18.6	27.0	0.81
B	14.8	18.0	0.65
C	15.1	8.8	0.98
D	22.0	21.2	0.75
E	-9.0	4.0	0.45
F	26.5	19.3	0.63
Market	13.0	12.0	-
Risk free rate	9.0	-	-

Rank these portfolios using Sharpes and Treynor's method.

Solution : *Dec.-12/Jan.-13, Q6(b)*

Sharpes Index

$$S_i = \frac{r_p - r_f}{\sigma_p}$$

r_p = Return on fund

r_f = Risk free rate

σ_p = Standard deviation.

Portfolio $A = \frac{18.6 - 9}{27.0} = 0.3555$

Portfolio $B = \frac{14.8 - 9}{18.0} = 0.3222$

Portfolio $C = \frac{15.1 - 9}{8.0} = 0.762$

Portfolio $D = \frac{22.0 - 9}{21.2} = 0.613$

Portfolio $E = \frac{-9.0 - 9}{4.0} = 4.5$

Portfolio $F = \frac{26.5 - 9}{19.3} = 0.906$

Ranking order of portfolios is F, C, D, A, B, E

Treynor's Index

$$T_n = \frac{r_p - r_f}{\beta_p}$$

Beta values are not given. Beta values can be estimated by using the formula,

$$\beta = r \frac{\sigma_n}{\sigma_m}$$

$A = 0.81 \times \frac{27.0}{12} = 1.82$

$B = 0.65 \times \frac{18.0}{12} = 0.97$

$C = 0.98 \times \frac{8.0}{12} = 0.65$

$D = 0.75 \times \frac{21.2}{12} = 1.32$

$E = 0.45 \times \frac{4.0}{12} = 0.15$

$F = 0.63 \times \frac{19.3}{12} = 1.01$

T_n for $A = \frac{18.6 - 9}{1.82} = 5.27$

T_n for $B = \frac{14.8 - 9}{0.97} = 5.97$

T_n for $C = \frac{15.1 - 9}{0.65} = 9.38$

T_n for $D = \frac{22.0 - 9}{1.32} = 9.84$

T_n for $E = \frac{-9.0 - 9}{0.15} = -120$

T_n for $F = \frac{26.5 - 9}{1.01} = 17.32$

Ranking order of portfolio's is F, D, C, B, A, E

---

3. From the following information, rank these mutual funds based on Sharpe's and Treynor's methods,

Mutual Funds	Average Annual Return	Standard Deviation	Correlation with Market
A	18	27	0.8
B	14	18	0.6
C	15	8	0.9
Market	13	12	-

Risk free rate of interest is 9.

Solution : *(Model Paper-I, Q10(a) April/May-14, Q6(b))*

(a) Sharpe Index

$$S_i = \frac{r_p - r_f}{\sigma_p}$$

Portfolio $A = \frac{18 - 9}{27} = 0.333$ II

Portfolio $B = \frac{14 - 9}{18} = 0.278 -$ III

Portfolio $C = \frac{15 - 9}{8} = 0.75 - $ I

Ranking order of portfolio's is C, A, B

Treynor Index

$$T_n = \frac{r_p - r_f}{\beta_p}$$

Beta values are not given. Beta values can be estimated by using the formula

$$\beta = r \frac{\sigma_p}{\sigma_m}$$

$A = 0.8 \times \frac{27}{12} = 1.8$

$B = 0.6 \times \frac{18}{12} = 0.9$

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$$C = 0.9 \times \frac{8}{12} = 0.6$$

$$T_a \text{ for } A = \frac{18-9}{18} = 5 \quad \text{III}$$

$$T_a \text{ for } B = \frac{14-9}{0.9} = 5.5 \quad \text{II}$$

$$T_a \text{ for } C = \frac{15-9}{0.6} = 10 \quad \text{I}$$

The ranking of portfolio's is is C, B, A.

(b) In comparison with Sharpe index, the order of B and A get reversed in the Treynor index. This may be due to their relationship with the market i.e., the systematic risk factor.

4. The following three portfolio provide the particulars given below:

Portfolio	Average Annual return	S.D. (σ)	Correlation coefficient
P	18	27	0.8
Q	14	18	0.6
R	15	-	0.9
	13	8	-
Market	13	12	-

Risk free rate of interest is 9.

(i) Rank these portfolio using Sharpe's and Treynor's model.

(ii) Compare both the indices.

Solution :   *May/June-16, Q6(b)*

The following three portfolio provides the particulars given below,

Portfolio	Average Annual return	Standard deviation	Correlation coefficient
A	18	27	0.8
B	14	18	0.6
C	15	8	0.9
Market	13	12	-

Risk free of interest is 9

(a) Rank these portfolios using Sharpe's and Treynor's method.

(b) Compare both the indices.

Note: The given question/problem is wrongly printed. The correct question/problem is as follows.

5. Rank the three funds given below with the help of Treynor and Sharpe index.

Growth Fund	Return (%)	Beta	σ
X	15	1.5	12
Y	17	1.6	14
Z	13	0.75	11
R_f	9	-	-

Solution :   *April-15, Q6(b)*

Treynor Index

$$T_a = \frac{r_p - r_f}{\beta_p}$$

$$\text{Fund } X = \frac{15-9}{1.5} = \frac{6}{1.5} = 4$$

$$\text{Fund } Y = \frac{17-9}{1.6} = \frac{8}{1.6} = 5$$

$$\text{Fund } Z = \frac{13-9}{0.75} = \frac{4}{0.75} = 5.33$$

Sharpe Index

$$s_i = \frac{r_p - r_f}{\sigma_p}$$

$$\text{Fund } X = \frac{15-9}{12} = \frac{6}{12} = 0.5$$

$$\text{Fund } Y = \frac{17-9}{14} = \frac{8}{14} = 0.57$$

$$\text{Fund } Z = \frac{13-9}{11} = \frac{4}{11} = 0.363$$

As per Treynor index, ranking order of portfolios is Z, Y, X.

As per Sharpe index, ranking order of portfolios is Y, X, Z.

5.1.2 Jensen's Differential Index

Q3. Write about Jensen's differential index.

Answer :

Another type of risk adjusted performance measure has been developed by Michael Jensen and is referred to as the Jensen's measure or ratio. This ratio attempts to measure the differential between the actual return earned on a portfolio and the return expected from the portfolio given its level of risk.

The CAPM model is used to calculate the expected return on a portfolio. It indicates the return that a portfolio should earn for its given level of risk.

The difference between the return actually earned on a portfolio and the return expected from the portfolio is a

measure of the excess return or differential return that has been earned over and above what is mandated for its level of systematic risk. The differential return gives an indication of the portfolio manager's predictive ability or managerial skills.

Using the CAPM model, the expected return of the portfolio can be calculated as follows,

$$\bar{r}_p = r_f + \beta_p (r_m - r_f)$$

Where,

$\bar{r}_p$ = The expected portfolio return

r_f = The risk free rate of return

r_m = The return on market index

β_p = The systematic risk of the portfolio

The differential return is calculated as follows,

$$\alpha_p = r_t - \bar{r}_p$$

Where,

α_p = The differential return earned

r_f = The risk free rate of return

$\bar{r}_p$ = The expected return.

Thus, α_p represents the difference between actual return and expected return. If α_p has a positive value, it indicates that superior return has been earned due to superior management skills. When $\alpha_p = 0$, it indicates neutral performance

It means that, the portfolio manager has done just as well as an unmanaged randomly selected portfolio with a buy and hold strategy

A negative value of α_p indicates that the portfolio performance has been worse than that of the market or a randomly selected portfolio of equivalent risk.

The alpha value in Jensen measure can be tested for its degree of significance from a value of zero by statistical methods.

This means, an analysts can determine whether the differential return could have occurred by chance or whether it is significantly different from zero in a statistical sense.

PROBLEMS

1.   Consider the following information for three mutual funds A, B and C and the market.

	Mean Return	Standard Deviation	Beta
A	15%	20%	0.90
B	17%	24%	1.10
C	19%	27%	1.20
Market Index	16%	20%	1.00

The mean risk-free rate was 10 percent. Calculate Sharpe's measure. Treynor measure and Jensen's measure for the three funds and for the market index.

OR

Consider the following information for three mutual funds A, B and C and the market.

Stock	Mean Return	Standard Deviation	Beta
A	15%	20%	0.90
B	17%	24%	1.10
C	19%	27%	1.20
Market Index	16%	20%	1.00

The mean risk-free rate was 10 percent. Calculate sharpe's measure, treynors measure and Jenlens measures for the three funds and for the market index.

Solution :   *(Model Paper-II, Q10(a) | April-17, Q6(b))*

Treynor Measure

$$\frac{\bar{R}_p - R_f}{\beta_p}$$

$$Fund\ A = \frac{15 - 10}{0.90} = \frac{5}{0.90} = 5.56$$

$$Fund\ B = \frac{17 - 10}{1.10} = \frac{7}{1.10} = 6.36$$

$$Fund\ C = \frac{19 - 10}{1.20} = \frac{9}{1.20} = 7.5$$

$$Market\ index = \frac{16 - 10}{1.0} = \frac{6}{1.0} = 6.00$$

Sharpe Measure

$$\frac{\bar{R}_p - R_f}{\sigma_p}$$

$$Fund\ A = \frac{15 - 10}{20} = \frac{5}{20} = 0.25$$

$$Fund\ B = \frac{17 - 10}{24} = \frac{7}{24} = 0.292$$

$$Fund\ C = \frac{19 - 10}{27} = \frac{9}{27} = 0.333$$

$$Market\ index = \frac{16 - 10}{20} = \frac{6}{20} = 0.3$$

Jensen Measure

$$= \overline{R}_p \quad [R_r + \beta_p (R_m \quad R_r)]$$

$$[\because R_m = \text{Market index}]$$

Fund $A = 15 \quad [10 + 0.90(6)]$

$= 15 - [10 + 5.4]$

$= 15 - (15.4) = 15 - 15.4 = -0.4$

Fund $B = 17 \quad [10 + 0.10(6)]$

$= 17 \quad [10 + 0.6] = 17 \quad 10.6 = 6.4$

Fund $C = 19 - [10 + 1.20(6)]$

$= 19 - [10 + 7.2] = 19 - (17.2) = 1.8$

Market index $= 0$ (By definition)

2. XYZ and ABC are two mutual funds. XYZ has a sample mean of success 0.13 and faced ABC has 0.18 The riskier fund ABC having double the beta at 2.0 as fund XYZ. The respective standard deviations are 15% of ABC and 19% of XYZ. The mean return for market index is 0.12 while the risk free rate is 8%.

Compute sharpe's Treynor's and Jensen's indices and state which fund is better?

Solution :   Dec.-13, Q6(b)

(i) Sharpe's Index

$$S_t = \frac{r_p \quad r_f}{\sigma_p}$$

XYZ fund $= \dfrac{13 - 8}{19} = 0.263$

ABC fund $= \dfrac{18 - 8}{15} = 0.666$

Market performance $= \dfrac{12 - 8}{8} = 0.5$

(ii) Treynor's Index

$$T_n = \frac{r_p - r_f}{\beta_p}$$

XYZ fund $= \dfrac{13 - 8}{1.0} = 5$

ABC fund $= \dfrac{18 - 8}{2.0} = 5$

(iii) Jensen Index

$$r_p = r_f + \beta(r_m \quad r_f)$$

For XYZ fund

$r_p = 8 + 1.0(12 \quad 8) = 12$

For ABC fund

$r_p = 8 + 2.0(12 - 8)$

$= 16$

The difference between the actual and estimated returns,

$XYZ = 15 \quad 12 = 3$

$ABC = 19 \quad 16 = 3$

Result

Treynor index and sharpe index results differ sharpe index considers the total risk, but the Treynor index consider only the market risk.

3. A mutual fund's returns over the best six years along with the risk-free returns and market returns are given below:

Years	2009	2010	2011	2012	2013	2014
Risk-free returns	7%	11%	9%	8%	10%	9%
Market Returns	12%	7%	-2%	8%	14%	16%
M.F. Returns	14%	11%	8%	13%	17%	15%

You are required to find the Jensen's alpha and comment on the performance of the fund.

Solution :   Dec.-15, Q6(b)

Jensen's Performance Measure

The formula of Jensen's performance measure is,

$$R_p \quad R_r = \alpha + \beta (R_m \quad R_r)$$

Where,

$R_p = $ Returns on M.F

$R_r = $ Risk free returns

$R_m = $ Market returns

$\beta = $ Beta value $= ?$

Step 1

Finding Beta values, by using CAPM model,

$$R_p = R_f + \beta_p (R_m \quad R_r)$$

Where,

$R_p = $ Returns on M F

$R_f = $ Risk free rate

$R_m = $ Returns on market

$\beta = $ Beta value $= ?$

Year 2009: $R_f - 7, R_m - 12, R_p - 14$

$R_p = R_f + \beta_p (R_m \quad R_r)$

$14 = 7 + \beta_p (12 \quad 7)$

$14 = 7 + \beta_p (5)$

$14 = 7 + 5\beta_p$

$14 \quad 7 = 5\beta_p$

$7 = 5\beta_P$

$\beta_P = \frac{7}{5}$

$\beta_P = 1.4$

Year 2010: $R_f = 11, R_m = 7, R_P = 11$

$R_P = R_f + \beta_P (R_m - R_f)$

$11 = 11 + \beta_P (7 - 11)$

$11 = 11 + \beta_P (-4)$

$11 - 11 = \beta_P(-4)$

$0 = -\beta_P 4$

$\beta_P = \frac{0}{-4}$

$\beta_P = 0$

Year 2011: $R_f = 9, R_m = -2, R_P = 8$

$R_P = R_f + \beta_P (R_m - R_f)$

$8 = 9 + \beta_P (-2 - 9)$

$8 - 9 = -11 \beta_P$

$-1 = -11 \beta_P$

$\beta_P = \frac{1}{11}$

$\beta_P = 0.0909$

Year 2012: $R_f = 8, R_m = 8, R_P = 13$

$R_P = R_f + \beta_P (R_m - R_f)$

$13 = 8 + \beta_P (8 - 8)$

$13 = 8 + \beta_P(0)$

$13 - 8 = \beta_P$

$\beta_P = 5$

Year 2013: $R_f = 10, R_m = 14, R_P = 17$

$R_P = R_f + \beta_P (R_m - R_f)$

$17 = 10 + \beta_P (14 - 10)$

$17 = 10 + \beta_P(4)$

$17 - 10 = 4\beta_P$

$7 = 4\beta_P$

$\beta_P = \frac{7}{4}$

$\beta_P = 1.75$

Year 2014: $R_f = 9, R_m = 16, R_P = 15$

$R_P = R_f + \beta_P (R_m - R_f)$

$15 = 9 + \beta_P (16 - 9)$

$15 = 9 + \beta_P(7)$

$15 - 9 = 4\beta_P(7)$

$6 = 7\beta_P$

$\beta_P = \frac{6}{7}$

$\beta_P = 0.857$

Year	Beta Values
2009	1.4
2010	0
2011	0.0909
2012	5
2013	1.75
2014	0.857

Step 2

Calculating α values by substituting beta values in the Jensen's formula.

$R_P = R_f + \alpha + \beta (R_m - R_f)$

Year 2009: $14 - 7 = \alpha + 1.4 (12 - 7)$

$7 = \alpha + 1.4 (5)$

$7 = \alpha + 7$

$7 - 7 = \alpha$

$\alpha = 0$

Year 2010: $11 - 11 = \alpha + 0 (7 - 11)$

$0 = \alpha + 0(-4)$

$0 = \alpha + 0$

$\alpha = 0$

Year 2011: $8 - 9 = \alpha + 0.0909 (-2 - 9)$

$1 = \alpha + 0.0909 (-11)$

$1 = \alpha + (-0.9999)$

$1 = \alpha - 0.9999$

$-1 + 0.9999 = \alpha$

$\alpha = (-)0.0001$

Year 2012: $13 - 8 = \alpha + 5 (8 - 8)$

$5 = \alpha + 5(0)$

$5 = \alpha + 0$

$5 - 0 = \alpha$

$\alpha = 5$

Year 2013: $17 - 10 = \alpha + 1.75 (14 - 10)$

$7 = \alpha + 1.75 (4)$

$7 = \alpha + 7$

$7 - 7 = \alpha$

$\alpha = 0$

Year 2014: $15 - 9 = \alpha + 0.857\,(16 - 9)$

$6 = \alpha + 0.857\,(7)$

$6 = \alpha + 5.999$

$6 - 5.999 = \alpha$

$\alpha = 0.001$

Year	Alpha Values
2009	0
2010	0
2011	0.0001
2012	5
2013	0
2014	0.001

Step 3

Market Return $= \dfrac{12 + 7 - 2 + 8 + 14 + 16}{6}$

$= \dfrac{55}{6} = 9.167$

Alpha values $= (0 \times 100) + (0 \times 100) + (0.0001$
$\times 100) + (5 \times 100) + (0 \times 100)$
$+ (0.001 \times 100)$
$= 0 + 0 - 0.01 + 500 - 0 + 0.1$
$= 500.09$

Therefore, mutual fund's returns performed better than market return

4.   Reliance Mutual Fund (RMF), Treasury Bills (T-Bills) and Sensex have had the following returns over the past five years:

Year	RMF	T-Bills	Sensex
2006	8.4%	6.0%	6.0%
2007	-6.0%	10.8%	-4.80
2008	15.6%	8.4%	12.0%
2009	13.2%	7.2%	10.8%
2010	18.0%	9.6%	14.4%

Evaluate the performance of RMF using Jenson's differential index and comment on the result.

Solution :   *Dec.-14, Q5(b)*

Jensen's performance measure: The Jensen's performance measure formula

$R_s - R_f = \alpha + \beta_n\,(R_r - R_f)$

Where,

$R_s = $ Returns on RMF

$R_s = $ Returns on sensex

R_f Returns on T Bills

$\beta_n = $ Beta Value = ?

Step1: Finding the beta values, by using CAPM model

Given that,

$R_p = $ Returns on RMF

$R_f = $ Returns on factor = Treasury bill

$R_m = $ Returns on market = Sensex

$\beta = $ Beta Value = ?

$R_p = R_f + \beta_p(R_m - R_f)$

Year 2006

$R_p = 8.4,\ R_f = 6,\ R_m = 6$

$R_p = R_f + \beta_p\,(R_m - R_f)$

$8.4 = 6 + \beta_p\,(6 - 6)$

$\beta = 8.4 - 6$

$= 2.4$

Year 2007

$R_p = -6,\ R_f = 10.8,\ R_m = -4.8$

$6 = 10.8 + \beta_p\,(-4.8 - 10.8)$

$-6 - 10.8 = 15.6\,\beta_p$

$\dfrac{-16.8}{-15.6} = \beta$

$\beta = 1.077$

Year 2008

$R_p = 15.6,\ R_f = 8.4,\ R_m = 12$

$15.6 = 8.4 + \beta_p\,(12 - 8.4)$

$15.6 - 8.4 = 3.6\,\beta_p$

$\beta_p = \dfrac{7.2}{3.6}$

$\beta_p = 2$

Year 2009

$R_p = 13.2,\ R_f = 7.2,\ R_m = 10.8$

$13.2 = 7.2 + \beta_p\,(10.8 - 7.2)$

$13.2 - 7.2 = 3.6\,\beta_p$

$\beta_p = \dfrac{6}{3.6}$

$\beta_p = 1.67$

Year 2010

$R_p = 18,\ R_f = 9.6,\ R_m = 14.4$

$18 = 9.6 + \beta_p\,(14.4 - 9.6)$

$18 - 9.6 = 4.8\,\beta_p$

$\beta_p = \dfrac{8.4}{4.8} = 1.75$

Year	Beta Values
2006	2.4
2007	1.08
2008	2
2009	1.67
2010	1 75

Step2: Calculating the α values by substituting beta value in the Jenson's formula

$$R_p = R_f = \alpha + \beta (R_m - R_f)$$

Year 2006

8.4 $6 = \alpha + 2.4 (6 \quad 6)$

$2.4 = \alpha + 0$

$\alpha = 2.4$

Year 2007

6   $10.8 = \alpha + 1.08 (4.8 \quad 10.8)$

$16.8 = \alpha - 16.848$

$16.8 + 16.848 = \alpha$

$\alpha = 0.048$

Year 2008

15 6 $8.4 = \alpha + 2 (12 \quad 8.4)$

$72 = \alpha + 72$

$\alpha = 72 \quad 72$

$\alpha \quad 0$

Year 2009

13.2 $7.2 = \alpha + 1.67 (10.8 \quad 7.2)$

$6 = \alpha + 6.012$

$\alpha = 6 \quad 6.012$

$\alpha = -0.012$

Year 2010

18   $9.6 = \alpha + 1.75 (14.4 - 9.6)$

$8.4 = \alpha + 8.4$

$\alpha = 8.4 \quad 8.4$

$\alpha = 0$

Year	Alpha Values
2006	2.4
2007	0.048
2008	0
2009	- 0.012
2010	0

Step3: Calculation of RMF returns

Alpha Values $= (2.4 \times 100) + (0.048 \times 100) + (0 \times 100)$

$+ (0.012 \times 00) + (0 \times 100)$

$= 240 + 4.8 + 0 - 1.2 + 0$

$= 243.6$

Therefore, the performance of RMF indicates a normal growth since last 5 years

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5.1.3 Fama's Decomposition of Returns

Q4.   Describe Fama's decomposition approach.

Answer :   Jan./Feb.-02, Q5(b)

The performance measures assess the overall performance of a portfolio or fund. Eugene Fama has provided an analytical framework that allows a detailed breakdown of a funds performance into the source or components performance This is known as the Fama decomposition of total return.

The total return on a portfolio can be firstly divided into two components namely, risk free return and the excess return. Thus,

Total return = Risk free return + Excess return

The excess return arises from different factors or sources such as risk bearing and stock selection.

Hence, the excess return, in turn, may be decomposed into two components, namely, risk premium or reward for bearing risk and return from stock selection known as return from stock selectively. Thus,

Excess return = Risk premium + Return from stock selection

The risk of a security is of two types, systematic risk and unsystematic risk or diversifiable risk. When a portfolio of securities is created most of the unsystematic risk or diversifiable risk would disappear. But in practice, there is no portfolio systematic risk and a small amount of diversifiable risk.

Hence, the risk premium can be decomposed into two components namely, return from bearing systematic risk (market risk) and return for bearing diversifiable risk. Thus,

Risk premium = Return for bearing systematic risk + Return for bearing diversifiable risk

Thus, the total return on a portfolio can be decomposed into four components.

Return on portfolio = Riskless rate + Return from market risk + Return from diversifiable risk + Return from pure selectivity

This may be represented as,

$$R_p = R_f + R_1 + R_2 + R_3$$

Each components can be calculated as follows.

(i)   The risk-free rate of return (R_f) is the return available on a riskless asset such as the government security

(ii)   The return from market risk (R_1) is calculated as,

$$R_1 = \beta_p (R_m \quad R_f)$$

Where,

R_m = The return on the market index

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(iii) The return from diversifiable risk (r_2) is calculated as,

$$R_2 = \left[\left(\frac{\sigma_p}{\sigma_m}\right) - \beta_p\right](r_m - r_f)$$

Where,

σ_p = The portfolio standard deviation

σ_m = The standard deviation of the market index

(iv) The return from pure selectivity (R_3) can be obtained as the difference between the actual return and the sum of the other three components as,

$$R_3 = R_p - (R_f + R_1 + R_2)$$

The return from pure selectivity is really the additional return obtained by a portfolio manager for his superior stock selection ability. It is the return earned over and above the return mandated by the total risk of the portfolio as measured by standard deviation.

Mathematically, this can be calculated as the difference between the actual return on a portfolio and the return mandated by its total risk.

This is also known as Fama's net selectivity measure. The following formula may be used for calculating the measure

$$\text{Fama's net selectivity} = R_p - \left[R_f\left(\frac{\sigma_p}{\sigma_m}\right) - \beta_p(R_m - R_f)\right]$$

Where,

R_p = Actual return on portfolio

R_f = Risk free rate

R_m = Return on market index

σ_p = Standard deviation of portfolio return

σ_m = Standard deviation of market index return.

The return from net selectivity may be negative. This occurs when the actual return realized on a portfolio is less than that mandated by the total risk of the portfolio. This indicates that, due to poor stock selection, the portfolio has not earned the return expected from it commensurate with its total risk.

The decomposition of total return is useful in identifying the different skills involved in active portfolio management. A portfolio manager who attempts to earn a higher return than the market return assumes higher risk and depends on his superior stock selection ability to achieve the higher return. If he is successful the return due to pure selectivity would be positive

Portfolio evaluation completes the cycle of activities comprising portfolio management. It provides a mechanism for identifying weaknesses in the investment process and for improving the deficient areas. Thus portfolio evaluation would serve as a feedback mechanism for improving the portfolio management process.

PROBLEMS

1. Consider the following data on a portfolio,
    R_p = 21%, σ_p = 15%, R_m = 16%,
    σ_m = 12%, r_f = 10%, β_p = 0.85
    Compute the Fama's net selectivity.

Solution :

Fama's decomposition may be stated as,

$$R_p = R_f + R_1 + R_2 + R_3$$

Here,

R_f = 10%

R_1 = Return from market

R_2 = Return from diversifiable risk

R_3 = Return from pure selectivity

We have,

$$R_1 = \beta_p(R_m - R_f)$$
$$= 0.85(16 - 10) = 5.1\%$$

$$R_2 = \left[\left(\frac{\sigma_p}{\sigma_m}\right) - \beta_p\right](R_m - R_f)$$

$$= \left[\left(\frac{15}{12}\right) - 0.85\right](16 - 10)$$

$$= (1.25 - 0.85)(6) = 2.4\%$$

$$R_3 = R_p - (R_f + R_1 + R_2)$$
$$= 21 - (10 + 5.1 + 2.4)$$
$$= 3.5\%$$

Thus,

$$R_p = 10 + 5.1 + 2.4 + 3.5$$
$$= 21\%$$

Alternatively, Fama's net selectivity can be directly calculated as follows.

$$\text{Fama's net selectivity} = R_p - \left[R_f\left(\frac{\sigma_p}{\sigma_m}\right) - \beta_p(R_m - R_f)\right]$$

$$= 21 - \left[10 + \left(\frac{15}{12}\right)(16 - 10)\right]$$

$$= 21 - (10 + 7.5)$$

$$= 21 - 17.5$$

$$= 3.5\%$$

2. Mr Ajay has been managing the portfolio of a large mutual fund for the last two years He found that his portfolio had earned a return of 70.6%, the standard deviation of returns was 41.31% and had a beta of 1.121. During the same period, the return on the market as a whole was 41.4% and had the standard deviation of 19.44%. Assume that the risk-free rate was 12%. Compute the Fama's measure of net selectivity for Ajay's performance and show the breakup of its observed return in terms of its various components.

Solution :

Given that,

$$R_p = 70.60\%, \quad R_m = 41.40\%$$

$$\sigma_p = 41.31\%, \quad \sigma_m = 19.44\%$$

$$\beta_p = 1.121, \quad R_f = 12\%$$

Fama's net selectivity

$$= R_p - \left[R_f + \left(\frac{\sigma_p}{\sigma_m} \right) R_m - R_f) \right]$$

$$70.60 \quad \left[12 + \left(\frac{41.31}{19.44} \right) (41.4 \quad 12) \right]$$

$$= 70.60 \quad [12 + (2.125 \times 29.4)]$$

$$= 70.60 - [12 + 62.475]$$

$$= 70.60 - 74.475 = -3.875\%$$

Breakup of observed return in terms of its various components is given below,

1. Risk free return, $R_f = 12.00\%$

2. Compensation for systematic risk,

$$R_1 = \beta_p (R_m \quad R_f) = 1.121 (41.4 \quad 12)$$

$$= 32.96\%$$

3. Compensation for diversifiable risk,

$$R_2 \quad \left[\left(\frac{\sigma_p}{\sigma_m} \right) - \beta_p \right] (R_m - R_f)$$

$$= \left[\frac{41.31}{19.44} \quad 1.121 \right] (41.4 \quad 12)$$

$$= (2.125 \quad 1.121) (29.4)$$

$$= 1.004 \times 29.4 = 29.52\%$$

4. Net selectivity, $R_3 = \quad 3.88\%$

Total actual return,

$$R_p = R_f + R_1 + R_2 + R_3$$

$$= 12 + 32.96 + 29.52 - 3.88$$

$$= 70.60\%$$

5.2 MUTUAL FUNDS – GENESIS, FEATURES AND OBJECTIVES

Q5. What do you mean by mutual funds? State its features, types and objectives.

OR

What do you mean by mutual fund? What are its features? Explain different types.

(Refer Only Topics: Mutual Funds and its Genesis (Origin), Features of Mutual Funds, Types of Mutual Funds)

Answer :

Mutual Funds and its Genesis (Origin)

The concept of mutual funds is not new. Originating in the USA and moving on to the UK in the 1930s, this culture started in India only in 1960s, with the setting up of UTI in 1964. Mutual funds are financial intermediaries in the investment business.

In a mutual funds, the resources of many investors are pooled and invested to create a diversified portfolio. Thus, in a mutual funds the savings of many investors are combined to form a fairly large and well diversified portfolio of investment.

A mutual fund is a special type of investment institution which acts as investment conduit. It collects or pool the savings of the community and invests large funds in a fairly large and well diversified portfolio of sound investments.

It employs professionally qualified and well experienced investment consultants and fund managers who take the pooled money and invest it in a variety of bluechip companies which are selected from a wide range of industries with the object of maximizing returns/income on investments. Institutions that collectively manage the funds obtained from different investors have commonly came to be known as mutual funds.

Features of Mutual Funds

The mutual funds are characterised by the following features,

1. **Management**

The management consists of professionals who have expert knowledge and experience with relation to investments. They are able to manage portfolios in an efficient manner.

2. **Small Saver**

The persons with low income and low spending capacity can prefer mutual funds for saving small amount of their incomes. The mutual funds enable small investors to invest their funds in its wide range of products.

3. **Liquidity**

Mutual funds are liquid. They can be encashed at any time by considering their present Net Asset Value (NAV)

plus additional fee or charge If any applicable at the time of redemption. The investment need to be in units so as to measure the efficiency of the redemption purchase or sale of unit can be carried out by the investor at any time under an open-ended scheme The small investors are relieved from the burden of searching for other investors at the stock exchange or from the long Waiting periods for the encashment or liquidation of their funds.

4. Divesification

The mutual funds diversify the funds. The funds invested in mutual funds are invested in various stocks. Since every stock is not characterised by the same returns and exposes the risk could be diversified. By investing in a range of stocks. Every investor must analyse these risks before making an investment decision. However, along with these risks the mutual funds still prove to be more reliable since the diversified portfolio investment decisions are taken up by the experienced personnel and are more better than the individuals decisions. Such decisions need to be constantly reviewed on a regular basis to ensure that the diversification reduces the risk.

5. Analysis and Selection of Securities

The growth schemes of mutual funds involves the pooling of large number of equities. These schemes bear greater risks and are also associated with high potential for the generation of capital revenues. The mutual funds also provide income schemes. Under such schemes, the funds are invested in shares that ensure guaranteed returns. Basically bond or debentures are selected. The growth schemes are close-ended whereas the income schemes can be either open-ended or close-ended

6. Professional Management

In mutual funds, the funds are invested into securities which would be evaluated, monitored selected by the professional financial managers. They even carry out regular reviews with relation to these investments This ensure higher return to the investor than the individual investments made without the assistance of the professional expects.

Objectives of Mutual Funds

The objectives sought to be achieved by mutual funds are as follows

● To provide an opportunity for lower income groups to acquire without much difficulty property in the form of shares

● To cater mainly to the need of individual investor whose means are small

● To manage investor's portfolios in a manner that provides regular income, growth, safety, liquidity and diversification

Types of Mutual Funds

For answer refer Unit-V, Page No. 5.14, Q.No 6.

5.2.1 Types of Mutual Funds

Q6. Describe the various types of mutual funds available to the investor.

Answer :

Mutual funds can be classified into the following three broad categories,

1. Portfolio classification of mutual funds
2. Functional classification of mutual funds
3. Geographical classification of mutual funds.

1. Portfolio Classification of Mutual Funds

No two mutual funds schemes may be alike. Mutual funds always strive to meet the varied objectives of different types of investors. On the basis of their objectives and portfolio, mutual funds can be classified as under,

(i) Bond Funds

Bond funds provide fixed return for those who desire safety. The savings of investors are invested in various kinds of bond in which investment is made primarily with the investment objective of safety Bond funds are more liquid, diversified and conservative investments with modest capital gains.

(ii) Stock Funds

Stock funds are established for those who are willing to accept significant risks in the hope of very high returns. These are called common stock funds. The assets held in the fund are entirely the common stocks of diversified list of industrial corporations. These may be further classified as follows.

(a) Income Fund

Income fund is established to maximize the current income (i.e., interest and dividend) of investors. There are two aspects of income funds i.e , low investment risk generating constant income and high investment risk generating maximum income

(b) Growth Fund

Growth funds have the principal objective of capital appreciation of the investment over a period of time. The investment is made in equity stock which has above average growth potential. This is a high risk investment fund with high capital gain potential and low current income assurance.

▣ Money Market Funds

Money market funds are used in short-term liquid assets like Certificate of Deposits (CDs) or commercial papers and for them capital is raised by selling shares to the investing public at a price equal to the asset value of the existing shares outstanding plus a loading fee or service charge This is known as high liquid asset funds with very low risk and virtually no capital loss.

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(iv) Leveraged Funds

Leveraged funds or borrowed funds are used in order to increase the size of the value of the portfolio and benefit the shareholders by gains exceeding the cost of the borrowed funds.

Such funds are used in speculative and risky investments like short sale to take advantage of declining market to realize gains in the portfolio short sales.

(v) Balanced Funds

Some mutual funds are called 'Balanced funds' where assets are a judicious mixture of industrial stocks and bonds. With a view to embrace modest risk of investment and secure reasonable rate of return the funds are employed in high grade common stock with 25% to 40% investment in conservative fixed income securities like debentures, bonds and preference shares.

(vi) Special Funds

These funds invest only in specialized channels like,

(a) Gold and silver

(b) A specific country (Japan fund, India fund etc)

(c) A specific category of companies (Technology fund).

(vii) Index Linked Funds

These funds invest only in those shares which are included in the market indices and in the same proportion. Whenever the market index goes up, the value of such index linked funds also goes up. Conversely, when the market index comes down, the value of such index linked funds also goes down.

(viii) Dual Purpose Fund

Income and growth are two objectives which are achieved by offering half of the amount of funds to those investors who wish regular income and half to those who wish growth. The funds thus received are pooled together and used for investment. Any income derived from the portfolio goes to the investors who hold income shares. The investors who hold capital shares receive no income. Instead they receive capital gains arising from the sale of investments of total portfolio.

(ix) Real Estate Fund

Real estate funds is of closed-end type. The fund is named so because they invest the funds in real estate ventures. Such funds are of various types depending upon the real estate transactions.

2. Functional Classification of Mutual Funds

It is based on the characteristics of the mutual fund schemes opened for the public for subscription. Mutual funds on this account are classified as,

(i) Open Ended Mutual Fund

Mutual fund may have open ended schemes under which an investor is free to join the fund or withdraw from the fund at any time after an initial lock in period. Such funds announce sales and repurchase prices from time to time. Unit Trust of India's 1964 unit scheme is an example of such fund.

(ii) Closed Ended Mutual Fund

Such mutual funds do not issue shares or units or repurchase or redeem on a periodic basis. Units of such schemes can be redeemed only on termination or through dealing in secondary market. Canshare, Canstock, Cangrowth, SBI Magnum, Mastershare etc., are examples of such mutual fund.

3. Geographical Classification of Mutual Funds

Nation's boundaries provide territorial restrictions on the sale and purchase of mutual fund units as it is the case in commodity trade or services. On the basis of this fact, the classification is as follows.

(i) Domestic Mutual Funds

Domestic mutual funds are saving schemes which are opened for mobilizing savings of the nationals within the country. These schemes may be of different types.

All the schemes in vogue in the country by the existing mutual funds viz., UTI, GIC Mutual fund, LIC Mutual fund, SBI Mutual fund, Canbank Mutual fund etc., are the domestic schemes.

(ii) Offshore Mutual Funds

The schemes which are opened to attract foreign capital for investment purposes in the country of the issuing company are known as offshore funds. They facilitate cross-border fund flow which is a direct route for getting foreign currency without political strings or domination on the issuer country. The investors have to take currency and country risk.

The major offshore funds are UTI's India Fund 1986, SBI's India Magnum 1989, Canbank's Indo-Swiz Himalaya Fund 1990 etc.

Q7. Describe the broad categories of mutual fund schemes.

Answer :

Mutual funds specifically invest into three extensive main categories of financial assets, they are as follows,

Stocks

When the investment is made in equity and equity-related instruments then the investment products are termed as stocks.

Bonds

These are debt instruments which tends to mature morethan one year such as treasury bonds, quasi-government bonds, corporate debentures and asset based securities.

Cash

The debt instruments whose maturity period is less than one year forms cash. Example Treasury bills, commercial paper, Certificates of deposit, Reverse Report and call money and bank-deposits.

Mutual fund schemes are devided into three broad categories based on the nature and type of the asset-mix. They are,

1. Equity schemes
2. Hybrid schemes, and
3. Debt schemes

All these three schemes are explained in detail one after the other.

1. Equity Schemes

Equity schemes invest about 85% - 95% of their total investments in equity shares or equityrelated instruments whereas, the remaining balance gets invested as 'Cash' In india, equity schemes offered by mutual funds has been divided into five different sub-heads. They are,

(i) Diversified equity schemes
(ii) Index schemes,
(iii) Sectoral schemes,
(iv) Tax-planning schemes,
(v) Arbitrage Schemes

(i) Diversified Equity Schemes

Such types of equity schemes usually invests in a broadly diversified set of portfolio consisting of equity stocks of which nearly 20 to 50 (or) even more have been contributed by the large industries. Examples include HDFC Equity Scheme, UTI Master share scheme, and Reliance Vision Fund.

(ii) Index Schemes

This form of equity schemes invests their majorities of investment into the equity stocks which can be traded at various stock market indexes like S & P Nifty Index as the sensex where each and every stock is allotted a weight age equivalent to its contribution in the overall index. Hence, an index scheme may increase or decrease based on the tracking error similar to the index. The main objective of this scheme is to generate uniform returns for the index. Examples include UTI Master Index and Franklin India Index NSE Nifty.

(iii) Sectoral Schemes

As the name suggests, this scheme usually invests its major share of investment in the equity stocks of a prescribed sectors like pharmaceuticals, Information Technology, Telecommunications, power so on.

Investors are tempted/attracted by these type of schemes when they speculates about the growth of the specific sectors. Examples UTI Petro, Franklin Infotech and Reliance Pharma Fund.

(iv) Tax Planning Schemes

Such schemes are specifically meant for individuals and HUF's if they satisfies the conditions and standard limits as prescribed under the section 80C of the Income Tax Act. Such subscriptions need to be deducted prior to the calculations of taxable income Tax Planning Schemes are also termed as Equity linked savings schemes (ELSS). Examples Franklin India Taxshield and Reliance Tax Saver (ELSS) Fund.

(v) Arbitrage Schemes

Generally, price of a stock on the spot or cash market is lessthan its price in the future market. Such difference in the price exists due to incorporation of interest element in the equity markets. This Arbitrage Scheme allows the investor to gain revenues by simultaneous buying of stocks from the cash market and selling them in the future markets. The 'Spread difference between the cash (spot) and future price becomes zero on or before the expiry date of the futures contract i.e., the last thursday of every month.

This scheme usually has market-neutral stance which are not subjected to the volatility of normal equity schemes. It may be quasi-debt schemes which considers the interest element of the equity markets and exercise the tax-efficiency of equity schemes.

2. Hybrid Schemes

Hybrid Schemes invest their partial investments in equity instruments and remaining in the debt instruments and these schemes are also termed as "Balanced Schemes" Hybrid Schemes are of three types. They are,

(i) Equity-oriented
(ii) Debt-oriented and
(iii) Variable asset allocation.

(i) Equity-Oriented Schemes

Under this major part of investments are made in the form of equities i.e., nearly 60 percent of the portfolio and the rest is invested in the debt instruments which may be either bonds and cash. Examples include HDFC Prudence and Unit Scheme 95

(ii) Debt-Oriented Schemes

This scheme is termed as Debt-oriented hybrid schemes because major-part of investments are made in debt instruments. One of the most popular debt-oriented schemes in India includes the Monthly Income Plans whose debt-component constitutes about 85 to 90 percent (dominated by bonds) and only 10-15 percent is of equity component. Examples of this scheme, Birla MIP and FT India MIP

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(iii) Variable Asset Allocation Schemes

Under this scheme, the proportions of equity and debt are mixed based on some objective extension. For instance, during November, 2002 UTI has introduced an Indexed Link Plan (ILP) which is a plan under UTI Variable Investment Scheme. This scheme is an open-ended market scheme which involves the active allocation of assets between the debt and the equity under the varied market situations. The value of equity composition of the variable asset allocation schemes decreases with an increase in the market Index & Vice Versa when the trend of debt is considered.

3. Debt Schemes

Debt Schemes usually forms the investment made in the debt instruments either in the form of bonds or cash. The wide range of debt schemes are presently offered by mutual funds in India can be classified under different sub-heads (sub-types). They are,

- (i) Gilt Schemes
- (ii) Mixed Debt Schemes
- (iii) Floating Rate Debt Schemes
- (iv) Cash Schemes and
- (v) Fixed Maturity Plans.

(i) Gilt Schemes

This scheme invest only in government bonds i.e., major part of nearly 80-85% is invested in government bonds and the balance of 10–15 percent of the investment in cash. Gilt Schemes are also called as Government securities which involves the investment that has been made in the gilts of different maturities such as long-term, medium-term and short-term. Examples cover Tata GS7 and UTI G-sec.

(ii) Mixed Debt Schemes

This scheme typically invest in government bonds, corporate bonds and cash. 30-40 percent of the total investment made in government bonds, 40-55 percent is made in corporate bonds whereas, the rest is invested in cash. Examples: HDFC Income and UTI Bond.

(iii) Floating Rate Debt Schemes

This scheme invest in a portfolio compared of floating rate debt bonds, fixed rate bonds which can be swapped for the floating rate returns and cash. Examples include, Grindlays Floating Rate Scheme and ICICI Prudential Floating Rate Scheme

(iv) Cash Schemes

Under this scheme, investments are made primarily in money market instruments such as Treasury bills, Commercial Paper, Certificates of Deposit, Call Money and Reverse Repos and deposits with bank. Therefore, it is termed as money market schemes also called as liquid schemes. This scheme do have an allocation of around 25 percent in short-term bonds. Such schemes are characterised by the average portfolio maturity of lessthan 150 days. Examples HDFC Liquid and Reliance Liquidity Fund. Presently cash schemes constitute the largest share of the mutual fund industry in India as corporates are highly attracted by such schemes for parking their short-term surplus funds.

(v) Fixed-Maturity Plan

Closed ended fixed maturity plans constitute the Recent innovation in the field of debt schemes. They have fixed maturity period which ranges from three months to three years. They have indicative but not guaranteed/assured returns. The FMP primarily invests in the corporate bonds.

Usually, these FMP's provide higher post-tax return when compared with other competing instruments such as bank fixed deposits and different types of bonds because they are found to have been associated with several Tax beneficiaries

5.2.3 Closed - Ended Schemes VS Open -Ended Schemes of Mutual Fund

Q8. Write about open-ended and close-ended schemes and differentiate between the two.

Answer :

Close-ended Growth Funds

BOB growth 1995, a close-ended seven year growth oriented scheme was launched in November 1995 by the public sector BOB Mutual Fund. The objective of the scheme is to provide investors long-term capital growth and liquidity at NAV related price. The broad investment pattern was,

- Investment in equity-related instruments 60-90 percent.
- Debt and other fixed income instrument 0-25 percent
- Equity opportunity fund, a five year close-ended growth scheme was launched by UTI in May 1996. The investment pattern stated in the prospectus was,
- At least 80 percent of funds to be invested in equities and related instruments.
- Upto 20 percent of funds to be invested in debt and money market instruments.

Open-ended Growth Funds

- Tata equity growth fund, an open-ended growth fund was launched by Tata Mutual Fund in August 1995 with the objective of long-term capital appreciation through research-based investment. About 80 percent of the corpus is to be invested in equity and equity-related instruments. The balance is to be invested in debt securities and money market instruments.

4.   Templeton India Growth fund, an open-ended growth scheme was launched in August 1966, by Templeton Asset Management (India) Private Ltd. sponsored by the Templeton Franklin Group. The investment objective of the fund was to provide long-term capital growth to its unit holders. It was proposed to invest around 85 percent of the corpus in equity and equity-related instruments and the balance in debt and money market instruments.

Differences between Closed-ended and Open-ended Schemes

	Open-ended Schemes		Closed-ended Schemes
1	Open-ended schemes accept funds from investors and sell shares to the investors on a regular basis.	1	Closed-ended schemes offer subscriptions only for a limited period.
2	Open-ended schemes provide the facility of withdrawing funds to the investors by following the re-purchase arrangement.	2	Closed-ended schemes do not provide the facility of withdrawing funds to the investors as per their preference.
3	Open-ended schemes are not listed on secondary market.	3	Closed-ended schemes are listed on stock exchange/ secondary market.
4	In open-ended schemes of mutual fund duration is not specified for redemption.	4	In closed-ended schemes of mutual fund duration is specified for redemption.
5	The main feature of open-ended scheme is the liquidity.	5	The main feature of closed-ended schemes are market forces of demand and supply.

5.2.4 Advantages of Mutual Funds

Q9. Define 'mutual fund'. Briefly explain the advantages of mutual funds to small investors in India.

Answer :   *May/June-13, Q6(a)*

Mutual Fund

A mutual fund is a special type of investment institution which acts as investment conduit. It collects or pool the savings of the community and invests large funds in a fairly large and well diversified portfolio of sound investments.

Advantages of Mutual Funds for investors

Investors derive a number of advantages by investing their money in mutual funds. Some of these advantages are as under

1.   Reduced Risk

Mutual funds invest in a number of reputed and well managed bluechip companies. So, the fall in the price of a few scrips, will not affect them much. Because of such diversification and economies of scale in transaction cost, the risk of loss due to a fall in the value of few scrips is minimized. In other words, investors risk is reduced to the minimum

2.   Expertise of Professional Management

The investors get the expertise of professional money managers who watch the funds portfolio and take necessary decisions on what scrips are to be purchased, what scrips are to be sold and when they should be bought and sold. The fund managers maximize the income of the fund

3.   Diversification of Portfolio

When a person invests in a mutual fund. he participates in a large basket of shares of many different companies in a number of different industries which are included in the fund's portfolio. To achieve a similar degree of diversification, an individual investor has to spend considerable time and money. Further, since a fund purchase shares in large volumes it has the advantage of paying the minimum brokerage

4.   Automatic Reinvestment

In a mutual fund, it is possible to reinvest the dividends and capital gains. An individual investor, on the other hand, may not always find it easy to reinvest his dividends, which usually get frittered away

The automatic reinvestment feature of a mutual fund is a form of forced saving and can make a big difference in the long run.

5.   Selection and Timings of Investment

Expertise in the selection of shares, debentures etc., and timing is made available to investors so that invested funds generated higher returns to them.

5.3 NAVs – CONCEPT

Q10. Write about Net Asset Value (NAV) of mutual funds.

Answer :

NAV refers to Net Asset Value of a mutual fund. It is the actual value of the investments made by the mutual fund for each unit issued by it. It changes almost on a daily basis as the market prices of individual securities in the portfolio fluctuates. It is computed by the formulae given below

$$NAV = \frac{Asset - Liabilities}{Number \ of \ units \ outstanding}$$

It is given as,
$$NAV = \frac{[Value \ of \ investment + Receivables + Accrued \ income + Other \ current \ assets] - [Liabilities + Accrued \ expenses]}{Number \ of \ units \ outstanding}$$

Simply stated, NAV represents the fair value of a unit in a mutual fund.

Usually, the fund units at the time of application are sold at Public Offering Price (POP). The difference between NAV and POP is the sales charges recovered by the Asset Management Company from the scheme to cover cost of raising funds on a continuous basis. The POP is generally calculated as follows

$$POP = \frac{NAV}{1 - Sales \ charge}$$

PROBLEMS

1. **The data related to a mutual fund trust is as follows.**

Scheme Name	XYZ
Scheme size	₹ 20 lacs
Face value of units	₹ 10
Value of investments	+ ₹ 10.00 lacs
Receivables	+ ₹ 0.75 lacs
Accrued income	+ ₹ 0.25 lacs
Other current assets	+ ₹ 3.00 lacs
Liabilities	– ₹ 2.25 lacs
Accrued expenses	– ₹ 0.50 lacs

Calculate the NAV of the above mutual fund.

Solution : *Model Paper-II, Q10(b)*

NAV can be calculated by using the given formula.

$$NAV = \frac{[Value \ of \ investment + Receivables + Accrued \ income + Other \ current \ assets] - [Liabilities + Accrued \ expenses]}{Number \ of \ units \ outstanding}$$

$$= \frac{[10 + 0.75 + 0.25 + 3] - [2.25 + 0.50]}{2}$$

$$= ₹ 5.625 \ lacs$$

Number of units outstanding

$$= \frac{Scheme \ size}{Face \ value \ of \ units}$$

$$= \frac{200000}{10} = ₹ 200000 \ or \ simply \ ₹ 2 \ lacs.$$

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2. **If the maximum sales charge is 3% on the NAV of ₹ 13.50. Calculate the public offering price.**

Solution :

Public Offering Price (POP) is given as,

$$POP = \frac{NAV}{1 - Sales\ charge}$$

$$= \frac{13.50}{1 - 0.03}$$

$$= \frac{13.50}{0.97}$$

$$= ₹13.92$$

5.4 COSTS AND LOADS OF MUTUAL FUNDS

Q11. What are the costs and loads of investing in mutual fund?

Answer :

Cost and Loads Investing in Mutual Funds

The prime objective of investors investing funds in mutual funds is to earn maximum profit. But to earn these profits, investors need to bear certain costs or expenses for the services rendered to them by the AMC (Asset Management Companies). However, these costs are not charged without informing to investors. In fact, the details about these costs are mentioned in offer document which is given to every investors before investing in mutual funds. An offer document consists of all rules and regulations with regard to investment in mutual funds. The various costs involved are,

1. **Entry Load**

When investors purchase units of mutual fund, then they are liable to pay a front-end charge. It is a commission or sales fee given to brokers who sell funds to the investors. It is also termed as front-end load. Usually, mutual funds set a specific investment limit. If the investors investment is lower than the limit then they need to pay an entry load which is termed as load schemes. On the other hand, if the investors investment exceed the specified limit, then they are not liable to pay any such entry load and termed as no-load schemes.

2. **Exit Load**

When an investor sells his units to mutual funds then it is termed as an exit load. It is also called as back-end load or a redemption load.

Examples

(i) If a fund charges 3% as exit load and the scheme NAV is ₹ 15/- then at the time of selling the units, investor is liable to receive only ₹ 14.55/- (i.e., 15 − 0.45 (15 × 3%)) but not ₹ 15/-.

Apart from this, there is another load which is slightly different from above mentioned load called Contingent Deferred Sales Charge (CDSC). CDSC is specified by SEBI mutual funds regulation 1996 wherein the charge imposed reduces from year to year

(ii) In the first year, it may impose 4%, in the second year 3.5% and so on. In this manner, CDSC imposes charges upto four years. And after four years, the investors need not pay any exit charge if they sells the units.

Usually, AMC's can charge only any one load on the scheme of mutual fund i.e., either a entry load or an exit load but it is not possible to charge both at the same time on the funds.

The basic purpose of imposing charges is to retain the investors for a longer time

3. **Annual Recurring Expenses**

These expenses are borne by the AMC while functioning to form an efficient portfolio and control it effectively. These are usually recurring in nature and hence also called as operating expenses. Annual recurring expenses are fund management fees like administrative expenses, registrar fees, advisory fees, marketing and selling expenses.

Hence, AMC charges annual recurring expenses to the investors at a rate prescribed in offer document and under any circumstance, AMC is not supposed to exceed the annual recurring expenses. These expenses are denoted as expense ratio which is calculated by taking the specified percentage on net assets. Percentages keep varying with regard to investment. If the investment is low then the percentage charged would be higher and vice versa.

4. **Initial Issue Expenses**

Expenses which are incurred only at one time is termed as Initial Issue Expenses. These expenses include initial marketing, advertising and promotional expenses, registrar's expenses, commission to brokers etc. Generally, initial expenses charged are 6% from the initial investment.

There is one additional cost borne by the US investors known as 12b- charges which would come under operating expenses. The securities and exchange commission allow AMC to collect these costs for repaying distribution costs.

5.5 RETURN OF MUTUAL FUNDS

Q12. Describe in brief with regard to the investors return by investing in mutual fund.

Answer :

Returns on mutual funds can be obtained in various periods i.e., it could be on a monthly basis or on quarterly basis or even on yearly basis. Returns on mutual funds can be calculated by considering the following terms.

(a) Making the payment of capital gains.

(b) Distributing the interest or cash dividends.

(c) Net Asset Value (NAV) of a fund's per share is calculated by taking the difference between the value of NAV at beginning period from the value of NAV at ending period or in other way undistributed values of cash dividends and capital gains to the owners

Therefore, a mutual funds one period rate of return is expressed as follows

$$r_t = \frac{c_t + d_t + (nav_{t+1} - nav_t)}{nav_t}$$

Where,

r_t = Rate of return for period t

c_t = Capital gains for period t

d_t = Interest or cash dividends.

nav_{t+1}, nav_t = Net asset values from the time period t of beginning to end time period $t +$

However, the above calculated return to the investors, as it further deducts expenses in the form of load funds, no load funds and 12b-1 fees.

5.5.1 Methods of Calculating Returns of Mutual Fund

Q13. Explain about the various methods of calculating returns on mutual funds.

Answer :   *Model Paper-III, Q10(a)*

Returns can be calculated by three methods namely,

1. **Geometric Mean Return**

For answer refer Unit-V, Page No. 5.21, Q.No. 14.

2. **Dollar Weighted Return**

For answer refer Unit-V, Page No. 5.22, Q.No. 15, Topic. Dollar Weighted Returns (DWR).

3. **Time Weighted Return**

For answer refer Unit-V, Page No. 5.22, Q.No. 15, Topic. Time Weighted Returns.

Q14. Explain the procedure of calculating returns by applying geometric mean return with an example.

Answer :

Any investor before investing in any business considers two essential factors and those are return and risk. Geometric mean return evaluates the average rate of return for a particular period

Therefore, geometric mean return can be calculated is,

$$TMR = \sqrt[T]{(1 + r_1)(1 + r_2)....(1 + r_T)} - 1$$

Where r indicates return and 1, 2,...,T are time periods.

Example

Year	Return
1	10
2	3
3	12
4	7
5	9
6	12

We know that,

$$GMR = \sqrt[T]{(1 + r_1)(1 + r_2)...(1 + r_T)} - 1$$

$$= \sqrt[T]{(1 + 0.10)(1 + (-0.03))(1 + 0.125)(1 + (-0.07))(1 + 0.09)(1 + 0.12)} - 1$$

$$= \sqrt[6]{(1.10)(0.97)(1.12)(0.93)(1.09)(1.12)} - 1$$

$$= \sqrt[6]{1.356781494} - 1$$

$$= 1.052178449 - 1$$

$$= 0.052178449$$

$$= 5.22\%$$

Q15. Briefly discuss about the measures of return.

Answer :

Before studying about dollar weighted return and time weighted return, it is essential to know about the calculation of return. Return is measured as here under,

$$r = \frac{V_e - V_b}{V_b}$$

Where,

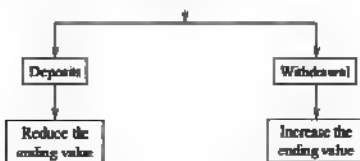r = Return

V_e = Values at the end of the period.

V_b = Values of the beginning period.

Investors usually come across two situations

(i) When cashflows occur just before the end of the period?

(ii) When cashflows occur just after the start of the period?

In order to obtain accurate returns in the case when earnings occur just before the period ends, an ending market value has to be modified whereas in the case of profits occurring in just after the period starts, then a market value which is beginning has to be altered.

When cash flows occur just before the period ends

Deposits	Withdrawal
Reduce the ending value	Increase the ending value

When cash flow occur just after the period begins
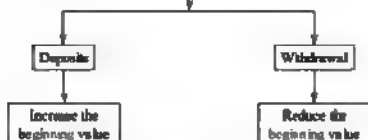
This explanation is applicable to both dollar weighted returns and time weighted returns.

Dollar Weighted Returns (DWR)

Dollar weighted rate of return calculates return of the investors portfolio by equating present cashflows (i.e., inflows minus outflows), market value at the beginning period and market value at the end of the period.

DWR is similar to Internal Rate of Return (IRR). Even the internal rate of return calculates returns by considering values at the beginning period and values made during the period.

Since, cash inflows or cash outflows are uncertain in nature it is not advisable to compare values of one portfolio with the values of other portfolio.

If the returns are in semi-quarterly form and wanted to transform into quarterly form then the following procedure has to be followed

1. Returns are calculated for each period of time.
2. Need to add 1 to each returns.
3. Value has to be squared.
4. Then, from the squared value, 1 has to be subtracted.

Time Weighted Returns

Time weighted return evaluates the returns of the investors on a portfolio by considering the investment made and earnings occurred between the period started to the period completed. It considers those values which occurs just before each term of earnings

Even in this method, semi-quarterly returns can be converted to quarterly returns and the procedure is here under.

1 Returns are evaluated for each period of time.
2 Need to add 1 to each of the returns.
3 Multiply all the returns
4 Finally from the above resultant subtract 1

5.6 MUTUAL FUNDS - PROBLEMS AND PROSPECTS IN INDIA

Q16. Explain about the problems and prospects of Indian mutual fund industry. State and explain how they are less risky than investments in stocks. *(Model Paper-I, Q18(b) | Dec.-15, Q6(a))*

OR

Discuss the problems and prospects of mutual funds in India. *April/May-14, Q6(a)*

(Refer Only Topics: Problems of Mutual Funds in India, Prospects of Mutual Funds in India)

OR

Explain the problems and prospects of mutual funds investment system in India.

(Refer Only Topics: Problems of Mutual Funds in India, Prospects of Mutual Funds in India)

Answer : *Dec.-13, Q6(a)*

Problems of Mutual Funds in India

The following factors have impeded the growth of mutual fund industry in India.

1. **Wrong Positioning**

The mutual funds in India have been quite wrongly promoted as an alternative to equity investing, thus creating very high expectations in the minds of investors. In a falling market, these expectations have been belied. Only the pure equity schemes (i.e index-linked schemes) can be compared with the stock market index. However, pure equity schemes are few in India further, investment is not purely linked to a particular index Therefore, returns from mutual funds cannot really be compared with the stock market index. Ignorance of these facts coupled with aggressive selling, have left many mutual funds unable to offer promised returns thus driving away many first-time investors.

2. **Limited Product Range**

Indian mutual funds have remained centered around a limited product range basically income, income-cum-growth and tax saving schemes. Efforts to develop and expand the market through innovative new products have been negligible. This has happened due to that tendency to avoid risk, inability to understand future market developments and change in investor preference Therefore, the extent of the mutual funds market has remained limited.

3. **Confused Market Situation**

Probably the introduction and implementation of new regulatory norms has contributed in some measure to market sluggishness, as the emerging market was initially, not able to respond to the regulatory objectives.

4. **Absence of Innovative Marketing Network**

The absence of product diversification and a confused market situation has been made worse by the absence of an innovative marketing network for mutual funds. The agent oriented network has largely been a failure because most of the agents have not been specifically trained to sell mutual fund products. This has led to a significant communication gap which has come in the way of market expansion.

5. Lack of Adequate Research Infrastructure

The passive approach of some mutual funds in managing investors funds is compounded by the lack of adequate research infrastructure. Consequently, returns commensurate with the market movemen could not be realized by many schemes, which has tended to show up ndian mutual funds in a bad light.

6. Inefficient Management

Management is considered to be a key factor for the operational efficiency of any business venture. This factor becomes even more crucial for service ventures such as mutual funds. What mutual funds require ask managers who have a clear understanding of the prevailing and emerg.ng market potential, investor preference and macro economic fundamentals.

7. Lack of Investors Education

The market success of any new product, particularly a financial product, depends largely on its acceptance by consumers, in this case of investors. Mutual funds must undertake a well-designed and comprehensive programme of investor education, espec ally aimed at investors in rural and semi-urban areas. However, this has been mostly neglected in India.

8. Lack of Media Support

Investor's understanding about mutual funds product and its features must be increased as it was found to be very low so far. This problem requires quick and structured attention.

This can be solved with effective use of media. A positive media support is also required and mutual funds need to be media friendly. A very closer coordination between AMFI, mutual funds and the media to promote investor education in India.

9. Ignorance of Liquidity Management

Overemphasis on asset management has often ignored the crucial importance of Liability management in mutual funds, leading many indian funds into a liquidity trap at the time of redemption A more scientific approach towards liability management needs to be adopted by the funds.

10. Risk Management Ignored

Derivatives has been widely used by the mutual funds as a measure of risk management in a complex and competitive market place. Further, the practice of stock lending, used widely in the western markets has induced efficiency in funds management. A regulatory environment for mutual funds needs to encourage these practices is India.

Notwithstanding the many problems, Indian mutual fund industry has within a short period, emerged as a significant financial intermediary, assisting efficient resource allocation, providing strong support to capital markets and helping investors (particularly the small investors) to realize the benefits of stock market investing.

The growing importance of Indian mutual funds in the market place may be noted in terms of increased mobilization of funds and growing number of investor accounts with Indian mutual funds.

India beyond 2000 would become a major world market and foreign funds would continue to flow along with the flow of foreign mutual funds and fund managers. This would lead to increased competition. Therefore, the domestic Indian funds need to think in terms of competitive edge.

In the global market place no industry can afford to be struck by inertia. In order to increase India's share in the global savings, Indian mutual funds need to rapidly expand their overseas operations In the final analysis, it is the management which is crucial to success of any business operation. Indian mutual funds wanting to survive in the global market must develop a dynamic management style based on flexibility, adaptability and acceptability.

The recent reforms and globalization process have offered tremendous opportunities to Indian mutual funds. While liberalization by itself does not produce any guarantee for growth, but institutionalization of liberalization through changes in managerial mind sets can definitely produce the desired results.

In a global capital market environment, Indian mutual fund industry can emerge as one of the strongest players by absorbing investment technology and modified managerial practices in the regional context, while thinking and acting with a global vision.

Prospects of Mutual Funds in India

The cumulative mobilization of resources by the mutual funds indicates on overall increase from ₹ 4,563 68 crore in 1986-87 (when only UTI operated) to ₹ 81,026.52 crore in 1995-96.

The institution wise distribution of resource mobilization (upto December 1995) indicates that UTI mobilized 83 3 percent of the total resources followed by public sector mutual funds (12 9 percent) and private sector mutual funds (3 8 percent).

The year-wise mobilization of resource (upto March 1995 by Indian mutual funds) indicates in more or less positive trend except in the year 1993-94 and 1995-96 when as earlier noted, yearly mobilization declined by 34.1 percent and 51 2 percent respectively.

The resources mobilized by mutual funds under different schemes. It is seen that the more popular schemes in India are the income and income-cum-growth schemes.

While the 62 income schemes (31 47 percent of the total) mobilized 34.11 percent of the funds (of the total of ₹ 81,026.52 crore), the 27 income-cum-growth schemes (13.7 percent) garnered 40.79 percent of the total funds. Although the growth schemes enterpercent of the total funds.

Although the growth schemes entered the market relatively later, they made good progress. Upto march 1996,55 (27 92 percent) growth schemes had mobilized 18.41 percent of the total funds. The tax saving schemes, ELSS* (25 38) could only manage 6 43 percent of the total funds due to the maximum limits (₹ 10,000 which is entitled for ax benefit.

Item	Income scheme	Growth scheme	Income growth scheme	Tax saving scheme	Venture capital scheme	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)
No of scheme	62	55	27	50	3	197
Percentage of schemes	31.47	27 92	13.71	25.38	1.52	100.00
Resource mobilized (₹ crores)	27,640.12	14,919.11	33,046.21	5,209.08	212.00	81,026.52
Percentage of resources mobilized	34.11	18.41	40.79	6.43	0.26	100.00

Table

Example

UTI mutual funds, IDBI mutual funds, ICICI mutual funds, Moothut mutual funds and Mutual funds of Axis Bank.

Mutual Funds are Less Risky Than Investments in Stocks

1   Investing in mutual funds is less risky compare to investment in stocks as risk in mutual funds is spread over many stocks than a single investor could able to manage.

2   Investment in mutual funds is like offering loan to government or corporation to receive it back with interest. They are less risky than stocks as they generate less returns than stocks.

3.   Being volatile in nature, mutual funds are less risky than investments in stock.

4.   In mutual funds, risk can be balanced by diversifying in different stocks which is not possible in individual stocks.

5.5.1 Regulation of Mutual Funds

Q17. Discuss the regulatory framework for mutual funds investment system in India.

Answer :   *Dec.-12/Jan.-13, Q6(a)*

Regulatory Framework in India

The securities and exchange board of India on 9th December, 1996 through its notification No. S.0856(E) has issued a set of comprehensive guidelines applicable to mutual funds

In January, 1998 some amendments were made by SEBI in these regulations. The highlights of the regulations are given below.

1.   **Formulation**

    (i)   Mutual funds are to be established in the form of trusts under the Indian Trust Act and are to be operated by separate Asset Management Companies (AMCs).

    (ii)   AMCs should have a minimum net worth of ₹ 10 crore.

    (iii)   AMC s and trustees of mutual funds are to be two separate legal entities and that an AMC to its affiliate cannot act as a manager in any other fund.

    (iv)   All the schemes launched by the Asset Management Company should be approved by the trustees and a copy of the offer document should be filed with SEBI

2.   **Schemes**

    (i)   The AMC should mention the following in offer document.

        (a)   The minimum amount it wishes to raise under the scheme and

        (b)   The amount of funds it may retain in case of oversubscription. In this case, all the applications who apply for five thousand units or less should be given full allotment keeping in view the oversubscription levels.

    (ii)   The mutual fund as well as the AMC are liable to refund the application money back wholly or in part if,

        (a)   The mutual funds does not receive the minimum amount which it mentions in the prospectus and

        (b)   The amount received for units is in excess of subscription.

(iii) Every close-ended scheme launched by the AMC should be listed on a recognized stock exchange within a period of six months from the date of closure of the subscription.

However, this is not mandatory in cases where

(a) There is a provision in the scheme for periodic repurchase facility to all the unit holders.

(b) The scheme provides for monthly income or if it takes into account the needs of certain classes of persons like senior citizens, women, widows or physically handicapped and children with a provision for periodic repurchase of units.

(c) The details of the repurchase facility are disclosed in the offer document.

(d) The scheme opens for repurchase within a period of six months from the date of closure of the subscription.

(iv) The AMC at its discretion can repurchase or reissue the units repurchased under the close-ended scheme.

(v) The units of a close-ended scheme can be converted into an open-ended scheme provided that,

(a) The offer document discloses the option and the period of such conversion (or)

(b) On the acceptance of the majority of the unit holders.

(vi) The close-ended scheme should be redeemed completely at the end of its maturity period.

However, it can be rolled over, provided that the majority of the unit holders pass a resolution to that effect and the unit holders not opting for roll over shall be allowed to redeem their units.

3. Investment Norms

(i) If the AMC decides to invest in debt instruments, they should be rated and it should not be below the investment grade. The rating should be from an authorized credit rating agency.

In case the debt instrument is not rated, the AMC should take the approach from its board.

(ii) No mutual fund, under all its schemes can own more than ten percent of any company's paid-up capital carrying voting rights.

(iii) If the AMC wishes to transfer investments from one of its schemes to its other schemes, it will be allowed on y if,

(a) The transfer of funds is done at the current market price of the said instruments on spot basis and

(b) The securities transferred satisfy the objectives of the scheme to which they are transferred.

(iv) A scheme can invest in other scheme managed by the same AMC or in a scheme managed by other mutual fund without charging any fees, only if the total interscheme investment made by the schemes managed by the same AMC or in schemes of other mutual funds does not exceed 5% of the NAV of the mutual fund.

(v) All the mutual funds should transact in securities on the basis of deliveries. In case of purchases made by it, it should take delivery of the securities, while in case of sales, it should give delivery of the securities. Under no circumstances, it shou d involve in short sales or carry forward transactions or engage in Badla finance.

(vi) The AMC can invest the funds of a scheme in short-term deposits of a scheduled commercial bank, until the period where it can identify the security which satisfies the investment objectives of the said scheme.

4. Rights of Investors

(i) Certificates

An investor is entitled to receive shares/unit certificates allotted to him within a period of 6 weeks from the date of closure of the subscription.

(ii) Transfer

An investor is entitled to get the unit/share certificates transferred within a period of 3 days from the date of lodgment for transfer.

(iii) Refund

If the total collection of the funds by a mutual fund is less than the minimum amount of subscription planned to be raised, as mentioned in the prospectus, the applicants are entitled to receive the entire application money as refund, within a period of six weeks from the date of closure of subscription.

Should the refund be delayed beyond this period, the applicants are entitled to receive, along with the application money, interest at the rate of 15% p a for the period of delay.

(iv) Disclosures

(a) An investor under a mutual fund scheme is entitled to receive information about the 'Net Asset Value' at intervals not exceeding one week. This information should be published in at least two daily newspapers.

(b) Every mutual fund is required to publish the audited annual report and unaudited half-yearly report, through prominent newspapers in respect of each of its

schemes, within six months and two months respectively of the date of closure of accounts

This set of guidelines will go a long way in providing a level playing field to all mutual funds.

5.6.2 Investor's Protection in India – SEBI's Regulation to Protect Mutual Fund Investor

Q18. Explain the regulatory framework proposed by SEBI to protect the investors of mutual fund.

OR

Explain about the regulatory authority which protects the investors interest in India.

(Model Paper-III, Q18(b) | May/June-16, Q6(a))

OR

Discuss the investors protection mechanism in India.

Answer :   *April-15, Q6(a)*

SEBI's Regulation to Protect Mutual Fund Investor in India

SEBI's basic objectives as the prime regulator of capital market activities in India is to protect the interests of investors. This objectives has been stated in the preamble of the securities and Exchange Board of India Act, 1991 thus, to protect the interests of investors in securities and to promote for development of and to regulate, the securities market and for matters connected therewith or incidental thereto. Accordingly all the capital market activities, including that of mutual funds are covered under the above objective so far as investor protection is connected.

SEBI came out with the new regulations in 1996 which eliminated many of the rigidities contained in the 1993 regulations and at the same time introduced new provisions as regards disclosure, transparency and obligations on the part of mutual funds, AMC's, trustees and key personnel

These regulations lay down many measures to protect mutual fund investors. Some of the measures are briefly discussed below.

1. SEBI has incorporated several provisions to check mutual funds at the entry level similar to the provision of 'fit and proper' test in the UK. Every mutual fund should be registered with SEBI and the registration will be granted on fulfilment of certain conditions laid down in the regulations for 'efficient and orderly conduct of the affairs of a mutual fund'

2. The regulations further stipulate that the sponsor must have a sound track-record and experience in the relevant field of financial services for a minimum period of five years, professional competence, financial soundness and general reputation of fairness and integrity in all business transactions

3. SEBI has laid down conditions of appointment and obligations of trustees and detailed guidelines on trust

deed. The Asset Management Company (AMC) to manage the assets mutual funds is to be approved by SEBI. SEBI also lays down the terms and conditions for the approval of the AMC, one of the conditions for approval being that the AMC has a net worth of not less than ₹ 10 crore.

4. The directors of the AMC are to be the persons having adequate professional experience in finance and financial services related fields. The key personnel of the AMC should not have been working for any AMC or mutual fund or any intermediary whose registration has been suspended or cancelled at any time by the board.

5. Mutual funds must have a custodian to be approved by SEBI and one of the preconditions for approval is the sound track-record, general reputation and fairness in transaction.

6. SEBI has laid down several provisions for pre-launch and post-launch disclosure to ensure that investors can take informed decision on the basis of factual information supplied by a mutual fund.

7. SEBI has outlined the advertisement code to be followed by a mutual fund in making publicity regarding a scheme and its performance. All mutual funds are bound to publish a scheme wise annual report or an abridged summary through an advertisement within six months of the closure of financial year

8. SEBI has prescribed norms for investment management with a view to minimize/reduce undue investment risks. There are also certain restrictions which are aimed at ensuring transparency and prohibiting mutual funds from excessive risk exposure

9. SEBI can inspect the books of accounts, record and documents of a mutual fund, trustees, AMC and custodian.

10. In addition, securities law (Amendment) Ordinance, 1995, further empowers SEBI with certain penal actions for violations of regulations and can impose monetary penalty

The Association of Mutual Funds in India (AMFI) was formed in August 1995 by the Indian mutual funds with a view to promoting and protecting the interest of mutual funds and their unit holders, increasing public awareness of mutual funds and serving the investors interest by defining and maintaining high ethical and professional standards in the mutual funds industry

To achieve this goal, AMFI has undertaken investors awareness programmes and is also working to bring out a comprehensive code of ethics for mutual funds. By the end of March 1996, 26 mutual funds were members of AMFI

SHORT QUESTIONS AND ANSWERS

Q1. Write a note on open ended funds and mutual fund.

OR

Open Ended Funds   *(Model Paper-I, Q5 | April-17, Q1(i))*

(Refer Only Topic: Open Ended Funds)

OR

Mutual Funds

(Refer Only Topic: Mutual Fund)

Answer :   *April/May-14, Q1(j)*

Open Ended Fund

Mutual fund may have open ended schemes under which an investor is free to join the fund or withdraw from the fund at any time after an initial lock in period. Such funds announce sales and repurchase prices from time to time. Unit Trust of India's 1964 unit scheme is an example of openended mutual fund.

Mutual Fund

A mutual fund is a special type of investment institution which acts as investment conduit. It collects or pool the savings of the community and invests large funds in a fairly large and well diversified portfolio of sound investments.

It employs professionally qualified and well experienced investment consultants and fund managers who take the pooled money and invest it in a variety of bluechip companies which are selected from a wide range of industries with the object of maximizing returns income on investments. Institutions that collectively manage the funds obtained from different investors have commonly came to be known as mutual funds.

Q2. NAV   *April-17, Q1(i)*

OR

Net Asset Value

Answer :   *(Model Paper-II, Q3 Dec.-15, Q1(i) | Dec.-14, Q1(i))*

NAV refers to Net Asset Value of a mutual fund. It is the actual value of the investments made by the mutual fund for each unit issued by it. It changes almost on a daily basis as the market prices of individual securities in the portfolio fluctuates. It is computed by the formulae given below

$$NAV = \frac{[\text{Value of investment} + \text{Receivables} + \text{Accrued income} + \text{Other current assets}] - [\text{Liabilities} + \text{Accrued expenses}]}{\text{Number of units outstanding}}$$

Q3. AMC

Answer :   *May/June-16, Q1(i)*

The Assets Management Company (AMC) approved by SEBI holds the fund by way of investments in different types of securities. The trustees have the power of appointing AMC on the advice given by sponsors. AMC is also appointed by either trustee or sponsors. The Assets Management Company (AMC) is a private limited company and the shareholders of this company are sponsors and joint venture partners. The minimum net worth required for AMC is ₹ 10 crores. The trustees sign the investment management agreement with the AMC

The types of AMC's are as follows,

(i)   AMC owned by financial institutions

(ii)   AMC owned by banks

(iii) AMC owned by Indian private sector companies

(iv)   AMC owned by FII's

(v)   AMC owned jointly by Indian and Foreign sponsors.

Q4. Exchange Traded Funds

Answer :   *May/June-16, Q1(j)*

Exchange Traded Funds (ETFs) are a type of mutual funds which possess the characteristics of both open and close ended funds. ETF has two parts

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(i) Open ended part and

(ii) Close ended part.

Open ended part of ETF can be sold to limited participants which are known as authorized participants. They can redeem the funds in future and can return the stocks. The ETFs which are listed on stock exchange can be purchased or sold by the retail investors at any time

Institutional investors often create ETF units by depositing a group of securities. In return for this deposit, the investors will get a fixed amount of ETF shares out of which the investors can sell some or all of the shares. Retail investors can buy and sell the shares after they are listed on a stock exchange like institutional investors.

ETFs can be used by investors for investments, arbitrage and trading.

Q5. Features of Mutual Funds

Answer : *Dec.-15, Q1(j)*

The mutual funds are characterised by the following features.

1. Management

The management consists of professionals who have expert knowledge and experience with relation to investments. They are able to manage portfolios in an efficient manner

2. Small Saver

The persons with low income and low spending capacity can prefer mutual funds for saving small amount of their incomes. The mutual funds enable small investors to invest their funds in its wide range of products.

3. Liquidity

Mutual funds are liquid. They can be encashed at any time by considering their present Net Asset Value (NAV) plus additional fee or charge. If any applicable at the time of redemption. The investment need to be in units so as to measure the efficiency of the redemption purchase or sale of unit can be carried out by the investor at any time under an open-ended scheme. The small investors are relieved from the burden of searching for other investors at the stock exchange or from the long. Waiting periods for the encashment or liquidation of their funds.

Q6. Put-call Parity Theorem

Answer : *May/June-13, Q1(j)*

Replace the S_0 in the put call parity of an option for stock yielding dividend at rate v by $S_0 e^{-vT}$, we get,

$$C + Ke^{-rT} = P + S_0 e^{-vt}$$

This can be proved directly by taking into consideration two portfolios.

Portfolio 1

A single European call option plus amount of cash equals to Ke^{-rT}

Portfolio 2

A single European call option plus e^{-vT} shares with dividend on shares being used for reinvestment in additional shares

Pricing Formulae

In the Black-Scholes formulas replace S_0 by $S_0 e^{-vT}$ Therefore, we get the price of European call option C and the European put option P, yielding dividend at rate v as,

$$C = S_0 e^{-vT} N(d_1) - Ke^{-rT} N(d_2)$$
$$P = Ke^{-rT} N(-d_2) - S_0 e^{-vT} N(d_1)$$

As,

$$\ln \frac{S_0 e^{-vT}}{K} = \ln \frac{S_0}{K} - vT$$

Therefore, d_1 and d_2 are as follows,

$$d_1 = \frac{\ln(S_0/K) + (r - v + \sigma^2/2)}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln(S_0/K) + (r - v - \sigma^2/2)T}{\sigma\sqrt{T}}$$

$$= d_1 - \sigma\sqrt{T}$$

When the dividend yield rate is known but tends to fluctuate during the option's life, the equations of C and P remain correct.

Q7. How to evaluate portfolio performance?

Answer : *Dec.-12/Jan.-13, Q1(j)*

Portfolio evaluation is the last step in the process of portfolio management. Portfolio analysis, selection and revision are undertaken with the objective of maximizing returns and minimizing risk. Portfolio evaluation is the stage, where we examine to what extent the objectives has been achieved. Through portfolio evaluation the investor tries to find out how well the portfolio has performed.

It is essentially the process of comparing the return earned on a portfolio with the return earned on one or more other portfolios or on a benchmark portfolio. Portfolio evaluation essentially comprises of two functions, performance measurement and performance evaluation. Performance measurement is an accounting function which measures the return earned on a portfolio during the holding period or investment period. Performance evaluation on the other hand, addresses such issues as whether the performance was superior or inferior, whether the performance was due to skill or luck etc., while evaluating the performance of a portfolio, the return earned on the portfolio has to be evaluated in the context of the risk associated with that portfolio.

Q8.   Stock Index Options

Answer :   *May/June-13, Q1(i)*

The stock index option refers to those options where the underlying asset is a stock index. It is valued using the following formula,

$$C + Ke^{''} = P + S_p e^{''}$$

The index is always considered to be an asset generating known yield. Therefore, the valuation of European stock index options is done using lower bound for options prices and the put call parity results for European index options. Here, S_p represents the value of the index, σ is the volatility of the index and v is the average annualized dividend yield on the index during the life of the option.

Q9.   Types of Mutual Funds   *(Model Paper-III, Q1 | April-15, Q1(j))*

<div align="center">OR</div>

State types of mutual funds.

Answer :   *(Dec.-13, Q1(j) | Dec.-12/Jan.-13, Q1(i))*

Mutual funds can be classified into three broad categories

1.   Portfolio Classification of Mutual Funds

    (i)   Bond funds

    (ii)   Stock funds

    (iii)   Money market funds

    (iv)   Leverage funds

    (v)   Balanced funds.

2.   Functional Classification of Mutual Funds

    (i)   Open ended mutual fund

    (ii)   Closed ended mutual fund

3.   Geographical Classification of Mutual Funds

    (i)   Domestic mutual fund

    (ii)   Offshore mutual funds.

Q10. Jensen's Differential Index

Answer :   *(April-15, Q1(i) | Dec.-13, Q1(i) | Jan.-12, Q1(j))*

Another type of risk adjusted performance measure has been developed by Michael Jensen and is referred to as the Jensen's measure or ratio. This ratio attempts to measure the differential between the actual return earned on a portfolio and the return expected from the portfolio given its level of risk.

The CAPM model is used to calculate the expected return on a portfolio. It indicates the return that a portfolio should earn for its given level of risk

The difference between the return actually earned on a portfolio and the return expected from the portfolio is a measure of the excess return or differential return that has been earned over and above what is mandated for its level of systematic risk. The differential return gives an indication of the portfolio managers predictive activity or managerial skills.

EXERCISE PROBLEMS

1   From the following information, construct the optimum portfolio as per Sharpe optimization model

Security	Expected Return	Beta, β	σ^2_{ei}
A	12	2.0	40
B	16	0.9	20
C	24	1.1	15
D	18	1.1	50
E	19	0.8	18
F	13	1.3	25

Risk-free rate is 8% and σ^2_m is 25.

(Ans: Only two securities, C and E, would consist of the portfolio in the ratio of 65% and 35% respectively. Ranking order is C, E, D, B, F and A).

2.   Consider the following information for three mutual funds, A, B, and C, and the market.

	Mean return (%)	Standard deviation (%)	Beta
A	12	18	1.1
B	10	15	0.9
C	13	20	1.2
Market index	11	17	1.00

The mean risk-free rate was 6 percent. Calculate the Treynor measure, Sharpe measure, and Jensen measure for the three mutual funds and the market index.

(Ans: Treynor measure : A = 5.45, B = 4.44, C = 5.83, Market index = 5
Sharpe measure : A = 0.33, B = 0.26, C = 0.35, Market index = 0.29
Jensen measure : A = 0.5, B = –0.5, C = 1.0, Market index = '0').

3.   Performance of two mutual funds and the market index is given below :

	Average Return	Risk, σ	Risk, β
Mutual fund A	10%	5%	0.5
B	12%	7%	0.4
Market index	20%	15%	1.0
Risk-free Rate	6%		

Calculate the Treynor, Sharpe and Jensen's performance measures for the mutual funds and the market.

(Ans: Treynor's Ratio : 8, 15, 14, Sharpe ratio : .8, .86, .93, Jensen's Alpha: – 3, .4, 0).

4.   Following information is available regarding four mutual funds

Mutual Fund	Return, R	Risk, σ	β (Beta)
A	13%	16	.90
B	17%	23	.86
C	23%	39	1.20
D	15%	25	1.38

Evaluate performance of these mutual funds using Sharpe ratio and Treynor's ratio. Comment on the evaluation after ranking the funds, given that the risk-free rate is 9%.

(Ans: Sharpe ratio : 0.25, 0.34, 0.35 and 0.24, Treynor's ratio : 4.44, 9.30, 11.66, and 4.34).

5.   Following information is available in respect of various investment strategies :

Strategy	% Return	Risk, σ	Beta, β
Portfolio A	10	18	60
Sensex	12	13	1.00
T-bills	6	–	–

Find out the Treynor's ratio and Sharpe's ratio and comment on the performance of these strategies.

(Ans: Treynor's ratio : 6.67 and 6.00, Sharpe ratio : 0.22 and 0.46).

INTERNAL ASSESSMENT

I. Multiple Choice

1. Mutual funds are classified on the basis of _____. [   ]
   - (a) Portfolio
   - (b) Functional
   - (c) Geographical
   - (d) All the above

2. Funds established for those who are willing to accept significant risks in the hope of very high returns are _____. [   ]
   - (a) Stock funds
   - (b) Bond funds
   - (c) Leveraged funds
   - (d) Special funds

3. On the basis of Geographical classification, mutual funds are _____. [   ]
   - (a) Domestic mutual funds
   - (b) Off-shore mutual funds
   - (c) Both (a) and (b)
   - (d) Foreign mutual funds

4. Exit load is also termed as _____. [   ]
   - (a) No - load scheme
   - (b) Back-end load
   - (c) Redemption load
   - (d) Both (b) and (c)

5. _____ method evaluates the average rate of return for a particular period. [   ]
   - (a) Geometric mean return
   - (b) Dollar weighted return
   - (c) Time weighted return
   - (d) None of the above

6. The factors which impeded the growth of mutual fund industry in India are _____. [   ]
   - (a) Wrong positioning
   - (b) Limited product range
   - (c) Confused market situation
   - (d) All the above

7. Reward to volatility ratio is also termed as _____.   [   ]

   (a) Sharpe ratio

   (b) Treynor ratio

   (c) Jensen's measure

   (d) Jensen's ratio

8. The actual value of the investments made by the mutual funds for each unit issued by it is _____. [   ]

   (a) NPV

   (b) GDP

   (c) NAV

   (d) GP

9. A change in portfolio profile buying and selling shares in response to new information is _____. [   ]

   (a) Portfolio upgrading

   (b) Portfolio balancing

   (c) Portfolio retension

   (d) Portfolio revision

10. The factors to be considered for protecting the portfolio from risk and estimating the cashflows accurately are
    _____.   [   ]

   (a) Liquidity

   (b) Time horizon

   (c) Taxes

   (d) All the above

II. Fill in the Blanks

1. _____ is a special type of investment institution which acts as investment mediator.

2. _____ are judicious combination of industrial stocks and bonds.

3. NAV refers to _____ of a Mutual fund.

4. The funds which invest only in those shares which are included in the market indices are _____.

5. _____ evaluates the returns of the investors on a portfolio by considering the investment made and earning incurred between the period started to period completed.

6. _____ is a long term approach designed to allocate the assets by selecting an effective portfolio which consists of various suitable assets.

7. _____ signals the trust of the investor in the stock market.

8. The purpose of _____ is to maintain the existing portfolio in act in the light of changing liquidity needs and to maintain adequate diversification.

9. _____ has provided an analytical framework that allows a detailed breakdown of a funds performance into the source or components performance.

10. The ratio which attempts to measure the differential between actual return earned and return expected from portfolio is _____.

KEY

I. **Multiple Choice**

1. (d)
2. (a)
3. (c)
4. (d)
5. (a)
6. (d)
7. (b)
8. (c)
9. (a)
10. (d)

II. **Fill in the Blanks**

1. Mutual fund
2. Balanced funds
3. Net asset value
4. Index linked funds
5. Time weighted returns
6. Strategic asset allocation
7. Confidence index
8. Portfolio rebalancing
9. Eugene fama
10. Jensen's measure or ratio.

III.   Very Short Questions and Answers

Q1.   What is a Closed Ended Mutual Fund?

Answer :

Closed ended mutual funds do not issue shares or units or repurchase or redeem on a periodic basis. Units of such schemes can be redeemed only on termination or through dealing in secondary market. Canshare, Canstock, Cangrowth, SBI Magnum, Mastershare etc., are examples of such mutual fund.

Q2.   What do you mean by Money Market Fund?

Answer :

Money market funds are used in short-term liquid assets like Certificate of Deposits (CDs) or commercial papers and for them capital is raised by selling shares to the investing public at a price equal to the asset value of the existing shares outstanding plus a loading fee or service charge.

Q3.   What is Geometric Return?

Answer :

Any investor before investing in any business considers two essential factors and those are return and risk. Geometric mean return evaluates the average rate of return for a particular period.

Therefore, geometric mean return can be calculated as,

$$GMR = \sqrt[T]{(1 + r_1)(1 + r_2)....(1 + r_T)} - 1$$

Where r indicates return and $1, 2,...., T$ are time periods.

Q4.   What is Mutual Fund?

Answer :

A mutual fund is a special type of investment institution which acts as investment conduit. It collects or pool the savings of the community and invests large funds in a fairly large and well diversified portfolio of sound investments.

Q5.   Write a note on Fama's Decomposition of Returns.

Answer :

The performance measures assess the overall performance of a portfolio or fund. Eugene Fama has provided an analytical framework that allows a detailed breakdown of a funds performance into the source or components performance. This is known as the Fama decomposition of total return.